Replacing the Alberta Personal Income Tax with a Sales Tax:

Not Heresy but Good Economic Sense

Kenneth J. McKenzie, PhD
Professor of Economics, University of Calgary

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P.O. Box 6572, Station D Calgary, AB, CANADA T2P 2E4 • Ph: (403) 264-9535 • Fax: (403) 269-4776 • www.cwf.ca

Dr. McKenzie is a member of the Tax and Finance Committee of the Alberta Economic Development Authority (AEDA). Some of the analysis in this study is based on simulations using Statistic Canada's Social Policy Simulation Database and Model (SPSD/M). The assumptions and calculations underlying the simulations were prepared by the author, and the responsibility for the use and interpretation of the data lies entirely with him. The author extends his thanks to Kenneth Coulter for excellent research assistance and to CWF Senior Policy Analyst Robert Roach for preparing the report for publication. The author also wishes to thank the members of the Advisory Committee for their feedback and insights.

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For more information about this report, please contact Dr. Roger Gibbins, President and CEO, Canada West Foundation (rgibbins@cwf.ca).

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Advisory Committee's Overview

What about eliminating provincial personal income tax in Alberta? It would be a bold step, leaving Albertans only liable for federal income tax. There could be a substantial benefit to Albertans in a number of respects. Alberta is in a unique position to be able to consider such and initiative.

While Albertans generally pay lower personal income taxes than citizens in other provinces, Albertans are paying more in personal income taxes than citizens in most other industrialized countries. Personal savings in Canada have decreased substantially. Canada's productivity has not kept pace with competitor nations. There is a mounting concern about Canada's ability to retain and gain highly trained people and their capital. At the same time, there is a market trend in most other jurisdictions to decrease personal income taxes in favour of consumption taxes.

Against this background, Dr. Ken McKenzie was asked to conduct a study which, amongst other things, would examine the feasibility and impact of eliminating provincial personal income taxes in Alberta. Further, the study would contemplate that in order to reduce the revenue shortfall of such income tax elimination, a provincial consumption tax (sales tax) would be introduced which would provide a sales tax rebate for lower income Albertans. The overall premise of the elimination of the income tax and its replacement with a sales tax would be that all Albertans must be "winners" in the sense that all Albertans would have more income after paying taxes under the sales tax regime than they otherwise would under the application of the Alberta government's proposed 11% single rate tax (which involves a tax reduction of $600 million). Further, the study would consider whether the incremental revenue loss to the province through the income tax elimination/sales tax approach would be manageable in Alberta having regard to its surplus and the expansion of economic base in Alberta that would follow from such an initiative.

In short, with the benefit of Dr. McKenzie's excellent study, the Advisory Committee is of the view that the possibility of personal provincial income tax elimination together with the introduction of a provincial sales tax (harmonized with the federal GST) with a rate at about 7% - 8% (in the range of the rate of existing provincial sales taxes in other provinces) and which had a significant sales tax rebate feature, could be feasible in Alberta and would result in significant economic efficiencies (labour, savings, work incentive, administrative costs, economic expansion). As this initiative could make Alberta very competitive with most any jurisdiction in the developed world (e.g., Texas which has a sales tax at 6.25% and no state personal income tax), it warrants full consideration.

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Dr. Roger Smith, Vice-President (Research and External Affairs), University of Alberta
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Executive Summary

Alberta is uniquely positioned to eliminate the provincial personal income tax as part of an innovative tax restructuring that would allow it to challenge head-on the world's most progressive economies. As Alberta is the only province without a consumption tax, it is singularly capable of keeping pace with a changing global economy where the most highly successful jurisdictions are shifting the relative tax load ***from*** income taxes ***to*** consumption taxes.

Albertans would derive substantial and sustainable benefits if the province were to move away from the Canadian tradition of taxing income and replace the lost revenue with the proceeds from a consumption tax equal to or less than the national average. Over time, as the newest Alberta Advantage is fully exploited, the potential exists to reduce or even possibly eliminate the consumption tax.

The benefits of eliminating the provincial personal income tax in exchange for a consumption tax are an unparalleled opportunity. In addition to immediately placing the equivalent of at least $850 into the hands of the average Alberta family, the taxation change is likely to generate significant economic momentum.

The immediately quantifiable benefits include large efficiency improvements in both the labour and capital components of the Alberta economy as the province moves away from the current system that taxes earnings and savings. Although long-term benefits cannot immediately be quantified, making the change will almost certainly reduce the province's potential brain drain, increase capital investment, enhance the entrepreneurial environment, and attract new knowledge-based initiatives to Alberta. It will help ensure Alberta is capable of sustaining its enviable quality of life in an ever-changing global economy, and attract the intellectual capital necessary to provide high-quality employment for generations to come.

Albertans would be significantly better off if the provincial personal income tax were eliminated and replaced by a provincial sales tax. They would have more after-tax disposable income, the investment environment would be improved, and Alberta's competitive position within the international economy would be enhanced.

A tax cut of approximately $850 million would be required if the proposed single rate (11%) personal income tax were to be replaced by an Alberta sales tax set at the national average. This cut includes the implementation of an innovative sales tax rebate program to ensure that every income group is financially better off with the elimination of the provincial income tax. Further reductions below the national sales tax average would cost the province about $400 million for each one percentage point drop – amounts within the capacity of the existing government surplus.

When a tax cut of this magnitude is placed against anticipated provincial surpluses, it is clear that the elimination of the provincial personal income tax is easily within reach. The study, moreover, does not project the incremental revenues that would flow to the government due to increased economic activity – increases that are likely to be sizeable over time. Thus the province has the capacity to again exercise the national leadership which placed Alberta at the forefront of Canadian efforts to eliminate public debts and deficits.

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1. Introduction

Imagine an Alberta with no provincial personal income tax. Is such a thing possible? And if possible, would it be desirable? These are provocative questions. The purpose of this study is to undertake an analysis of these questions, and to provide an analytical and empirical framework that will permit a response.

How could the province eliminate its share of the personal income tax without a substantial decrease in government spending? Quite simply by changing the way that the province raises the revenue it needs to meet its spending obligations. Alberta is currently the only province in the country that does not levy a general sales tax. This suggests the possibility of eliminating the province's share of the personal income tax by introducing a sales tax to replace the forgone revenue. While Albertans would continue to pay federal personal income taxes, they would pay no provincial personal income taxes. This is not an option that is realistically open to any other province in the country without the imposition of what most would consider unrealistically high sales tax rates. Alberta is the only province in the country that has at its disposal a largely "untapped" source of revenue, and is therefore in the unique position of being able to contemplate using this revenue source to replace much or all of the personal income tax.

The observation that Alberta is the only province in Canada that imposes no general sales tax begs (at least) two questions. The first falls largely under the purview of politics, and involves the simple query – why? Why is it that, of all of the jurisdictions in the country – including the federal government – Alberta is the only one not to impose a general sales tax? A common response to this question is that Alberta is able to generate substantial revenue from oil and gas royalties, so it does not ***need*** to impose a sales tax. Indeed, resource revenues allow the province to have among the lowest income tax rates in the country despite its lack of a sales tax. Yet this response is unsatisfactory as it does not address the fundamental question of why Albertans have chosen to forgo sales tax revenues while relying on revenues from personal income taxes, corporate income taxes, user fees, excise taxes, health levies, lottery revenues, etc. Why, for example, have Albertans ***not*** chosen to impose a general sales tax and use resource revenues to eliminate or at least reduce provincial personal income taxes? Albertans take fierce pride in being the only province in the country without a provincial ***sales*** tax; why would they not take similar (or even greater) pride in being the only province in the country without a provincial ***income*** tax?

The second question is an economic one. What are the economic implications for Alberta of relying on these other sources of revenue to the exclusion of a general sales tax? This question is multidimensional, concerning things like the level of economic activity and income in the province, the distortions caused by the tax system, the rate of economic growth, the amount of savings and investment, the distribution of income, and the costs of administering and complying with the tax system.

The purpose of this study is to examine the second, economic, question in some detail. While the first question, the political one, will not be directly addressed in the study, economic considerations are clearly an important element of political decisions (and vice versa). As such, some insight into the political question of why Albertans have chosen to forgo general sales tax revenues in favour of personal income tax revenues may emerge as a corollary to the economic evaluation, although the issue will not be specifically investigated in this study.

While at first blush the idea of completely eliminating the provincial income tax and replacing it with a sales tax may be viewed by some as farfetched, upon reflection it really is no more so than eliminating the general sales tax and replacing it with a personal income tax, which is essentially what Albertans have opted for under the current system. By way of contrast, several US states impose no personal income tax but do levy a sales tax. Texas, for example, a sub-national jurisdiction dominated by the oil and gas industry and thus often compared to Alberta, imposes no state personal income tax but does levy a 6.25% sales tax.

The assessment of the substitution of a sales tax for the income tax in Alberta is an exercise in the analysis of the ***tax mix*** in the province, which concerns the relative reliance of the government on various ***tax bases*** (e.g., personal income, corporate income, wealth, consumption, etc.). As one might expect, determining the "correct" tax mix is a complicated matter that involves many trade-offs, some of which will be explored in what is to follow.

The investigation is further complicated by the fact that it can be difficult to separate the issue of tax ***mix*** from that of tax ***design***. This is because there are many ways of designing a tax on a particular base; and how a particular tax is designed may well affect the nature of the trade-offs alluded to above, and therefore the extent to which it is, or should be, relied upon to generate revenue for the government. Indeed, as shall be seen below, a very relevant case in point concerns the design of a ***consumption tax***. While the term ***sales tax*** has been used to this point, a sales tax is just one way of taxing consumption. Nonetheless, many of the benefits of consumption taxation are independent of the specific design of the consumption tax. As such, when there is no scope for confusion the terms ***sales tax*** and ***consumption tax*** will be used interchangeably in much of the discussion that is to follow.

Another complicating factor concerns the ***level*** of taxation in Alberta, as distinct from tax mix and tax design. This, of course, speaks to the overall size of the government sector. The primary interest of the study lies more with the design, structure, and mix of the tax system than with the amount of taxes collected. As such, much of the analysis will take place from a ***revenue neutral*** perspective, where the economic implications of replacing the provincial income tax with a general sales tax that raises approximately the same revenue are examined. Nonetheless, many analysts have suggested that there is scope for further tax cuts in Alberta. Thus, an analysis will also be conducted of some alternative scenarios that involve the delivery of tax cuts in conjunction with the introduction of a sales tax to replace the provincial personal income tax.

What, however, is the "current" Alberta income tax and how much revenue does it collect, and therefore how much revenue would a revenue neutral sales tax need to generate in order to replace it? While the answer to these questions might appear to be obvious, matters have been complicated somewhat by the 1999 Alberta budget, in which the government announced its intention to make several changes to the Alberta personal income tax. These changes include the elimination of the 8% high income provincial surtax and the 0.5% flat tax, but more fundamentally the movement to an 11% ***Single Rate Tax*** (SRT) as a part of the province's movement to a "tax on income" approach to provincial income taxation by 2002. Indeed, in its most recent quarterly update, the government announced its intention to accelerate the introduction of the SRT to 2001 because of unexpectedly high revenues.

The problem this generates for this study is that the move to the SRT in 2001, along with the other changes to the tax system, will reduce provincial taxes by about $600 million, which is about 3.5% of total Alberta government revenues forecast for 1999/00.[1] So, what should constitute the "base case" against which a sales tax should be compared? The current system or the proposed SRT?

The approach taken in this study is to treat the SRT as the "base case" against which to compare the introduction of an Alberta sales tax. This seems sensible in light of the fact that the government has made a firm commitment to introduce the SRT by 2001, and any introduction of an Alberta sales tax would presumably take place after that. As such, any sales tax imposed in the future would replace (partially or completely) the SRT. It thus makes sense to compare a sales tax to the 11% SRT, as it is a better description of the relevant policy landscape in Alberta. This means that the revenue neutral sales tax examined in the study will raise roughly the same revenue as the 11% SRT, and will generate approximately $600 million less in revenue than the existing personal income tax in Alberta (in current dollars).

The remainder of the study is structured as follows. Section 2 provides an overview of the personal tax system in Alberta, both currently and as it is envisioned under the SRT. The structure and mix of the tax system in Alberta are compared to the other provinces in Canada and to selected international jurisdictions with a view to assessing where Alberta stands on both the national and international stages with respect to taxes levied on persons. Section 3 develops some of the important analytical background required to undertake an economic evaluation of the tax mix in Alberta. Section 4 is devoted to an analysis of the economic implications of completely eliminating the province's share of the personal income tax and replacing it with a sales tax. In particular, section 4 looks specifically at the efficiency and equity implications of such a change. The focus in section 4 is on the ***complete*** elimination of the personal income tax in Alberta and its replacement with a sales tax in a ***revenue neutral*** fashion. In section 5, this perspective is modified as alternative scenarios are considered, including a ***partial*** replacement of the income tax with a sales tax, and some ***non-revenue neutral*** configurations that would involve a tax cut. Section 6 is devoted to a discussion of other issues associated with the introduction of a sales tax in Alberta, including administration and implementation, and some effects that are not easily quantified but may nonetheless be quite important. Section 7 concludes with a discussion and summary of the key insights gained from the analysis.

2. The Alberta Tax Environment

In this section the structure and mix of personal taxation in Alberta are briefly summarized. The focus is on comparing Alberta to other provinces in Canada and with relevant countries internationally, in particular the US. The discussion is not meant to be exhaustive, but rather is intended to provide a feel for the current state of the tax environment in Alberta relative to other provinces and countries.

2.1 Personal Taxation in Alberta

The current approach to provincial income taxation in most of Canada is to determine provincial taxes as a percentage of federal taxes – the so-called "tax on tax" approach. For example, in Alberta basic personal income taxes are currently 44% of basic federal taxes.

While this determines the basic Alberta tax liability, the province also imposes a surtax of 8% on basic Alberta taxes in excess of $3,500, and a 0.5% flat tax on taxable income for all taxpayers. The "tax on tax" approach to provincial income taxation means that the provinces not only adopt the federal definition of the tax base (taxable income) but also the basic federal rate structure, and the degree of progression imbedded there-in, as determined by the federal government's choice of tax brackets, tax rates, and tax credits. Under the Tax Collection Agreements (TCA), in exchange for the provinces complying with the federal definition of taxable income and the degree of progression in the federal rate structure, the federal government administers and collects personal income taxes on behalf of the provinces. All provinces except Quebec belong to the TCA. Quebec levies, administers and collects its own provincial income tax, which is similar in basic structure to the federal tax, but does differ in some important respects, particularly with regard to rate structure.

In 1998, the federal government and the provinces negotiated several changes to the TCA. Most fundamental of those changes is the ability of the provinces to move to a "tax on base," or "tax on income" approach to provincial income taxation. As of 2001, the provinces will be able to impose personal income taxes directly on taxable income, rather than determining provincial taxes as a percentage of federal taxes; the federal government will continue to administer the system and collect personal income taxes on behalf of the provinces. Although under the new TCA the tax base will still be determined for the most part by the federal government, the provinces may choose any rate structure they wish.[2] As the first province to announce its intention to move to the new "tax on income" approach, Alberta has chosen to implement a flat rate structure by imposing a single provincial income tax rate of 11% for all taxpayers, the ***Single Rate Tax*** (SRT), in 2001. The province also announced that it will raise the current personal (and spousal) credit amount from the federal level of $7,131 to $11,620, eliminating approximately 78,000 low income taxpayers from the Alberta personal income tax rolls (Alberta Budget 1999).

How does Alberta's tax system compare to the rest of the country? When comparing tax systems across provinces, it is important to distinguish between marginal and average tax rates. Marginal tax rates are the tax rates that apply to an additional dollar of income earned by an individual. Average tax rates are total taxes divided by income, and thus represent the amount of taxes paid per dollar of income earned. A couple of tables and figures help paint the broad picture.

Table 2.1 presents the federal and provincial ***statutory marginal tax rates*** for selected levels of taxable income from employment, for all of the provinces except Quebec.[3] These rates reflect only the basic personal income tax rate in each province plus any flat taxes and surtaxes, and do not include any interaction with other taxes or transfer programs. The tax rates are calculated for a single individual with no dependents. For Alberta, the marginal rates under both the current system and the 11% SRT are shown. For all of the provinces, the tax rate reductions announced in the most recent (1999) provincial budgets are incorporated, even if they are not effective until a later date (as is the case, for example, in Manitoba where the rate reduction to 47% of federal taxes is effective in 2000, and, of course, the SRT in Alberta which is effective in 2001). As such, the table represents a "peek forward" at what statutory marginal tax rates may look like at the provincial level in the foreseeable future.

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Table 2.1
Statutory Marginal Tax Rates on Taxable Income (%)

Taxable Income	***Alberta***		***Other Provinces***								
	Current	*SRT*	*BC*	*SK*	*MB*	*ON*	*NB*	*NS*	*PEI*	*NL*	*Fed.*
$10,000	7.98	0	8.41	10.98	9.99	6.54	10.37	9.78	9.94	11.73	17.00
$20,000	7.98	11.00	8.41	10.98	9.99	6.54	10.37	9.78	9.94	11.73	17.00
$40,000	11.94	11.00	12.87	15.73	16.22	10.01	15.86	14.95	15.21	17.94	26.00
$50,000	12.86	11.00	12.87	17.60	16.22	12.01	15.86	14.95	16.73	17.94	26.00
$60,000	14.28	11.00	18.66	19.40	17.63	17.42	17.69	16.67	18.66	22.01	29.00
$80,000	14.28	11.00	21.39	19.40	17.63	17.42	17.69	18.34	18.66	22.01	30.45
$100,000	14.28	11.00	21.39	19.40	17.63	17.42	19.10	18.34	18.66	22.01	30.45

Note: Most recent tax rates announced in 1999 federal and provincial budgets (in Nova Scotia, the 1999 budget will not be passed into law because of a provincial election). In some cases, the tax rates will not be in effect until 2000 or 2001. Includes only basic taxes plus flat taxes and surtaxes.

As the table shows, under the current system Alberta has the second lowest statutory marginal income tax rate for the first four levels of taxable income ($50,000 and less), second to Ontario. Alberta has the lowest marginal income tax rates for the three highest income levels in the table ($60,000 and above). This is because Ontario has the lowest basic personal tax rate as a percentage of federal taxes (38.5% in Ontario vs. 44% for Alberta), but imposes two Fair Share Health Care surtaxes on high income individuals. The first Ontario surtax is 20% applied to basic Ontario taxes in excess of $3,845. The second surtax is an additional 36% (for a total of 56%) on basic Ontario taxes in excess of $4,800. While Alberta imposes a 0.5% flat tax on all taxable income, the current surtax is "only" 8% on basic Alberta taxes in excess of $3,500.

The SRT will flatten out the statutory marginal income tax rate schedule in Alberta. As indicated above, the provincial tax rate will drop to zero for many at the low end of the taxable income scale. There will be a slight increase in the statutory marginal income tax rate for individuals who are initially subject to provincial taxation (for example, in the table the statutory marginal tax rate on taxable income of $20,000 is three percentage points higher than the current system), and a decline in statutory marginal income tax rates for the rest.

Under the current system, the top statutory marginal income rate in Alberta is about 3 percentage points less than Ontario; under the SRT the gap will grow to about 6.5 percentage points. Comparisons with the other provinces are even more striking. For example, under the 11% SRT, Alberta's statutory marginal rates will be less than B.C.'s for virtually every taxable income, with a whopping 10.39 ***percentage point*** difference at the top rate.

Table 2.1 shows that Alberta's marginal income tax rates are, or will be, the lowest in the country. Table 2.2 shows that commodity tax rates in Alberta are lower as well. The table shows the ***statutory*** general sales tax rate in each province along with the ***average effective*** commodity tax rate. Although it is common to do so, the statutory sales tax rates cannot really be compared across provinces, because they are applied to different bases. The federal GST is a multi-stage tax that applies to most goods and services, with very few exemptions (about 85% of total consumer expenditures are taxed under the GST); it thus has a fairly broad,

Table 2.2
Commodity Tax Rates by Province, 1998 (%)

	Federal		***Provincial***		***Federal + Provincial***
	General Sales Tax Rate	*Effective Commodity Tax Rate*	*General Sales Tax Rate*	*Effective Commodity Tax Rate*	*Effective Commodity Tax Rate*
BC	7.0	6.1	7.0	5.6	11.7
AB	7.0	6.5	0.0	2.7	9.2
SK	7.0	6.6	6.0	7.3	13.9
MB	7.0	6.3	7.0	6.6	12.9
ON	7.0	5.8	8.0	6.7	12.5
PQ	7.0	6.2	7.5	6.6	12.8
NB	7.0	6.8	8.0	7.2	14.0
NS	7.0	6.5	8.0	7.3	13.8
PEI	7.0	6.5	8.0	NA	NA
NF	7.0	6.9	8.0	7.8	14.7
Non-Alberta Weighted Average	7.0	6.0	NA	6.6	12.6

Note: The effective commodity tax rate is calculated as total commodity taxes paid divided by the net of tax value of total expenditures, using the SPSD/M database. Federal rates vary across provinces because of different family expenditure patterns. Provincial calculations for PEI are not available.

comprehensive base. Three Atlantic provinces (Newfoundland, Nova Scotia and New Brunswick) adopted the federal base under the Harmonized Sales Tax (HST) introduced in 1997. Quebec's provincial sales tax is also largely harmonized with the federal GST. All of the other provinces, with the obvious exception of Alberta, levy single-stage Retail Sales Taxes (RST) that are applied to different, much narrower, bases. Virtually every RST exempts food and most services; many do not tax clothing in general or children's clothing in particular. Also, all provinces, including Alberta, impose special excise taxes on top of any provincial RST on goods such as gasoline, alcohol, jewelry, and hotel rooms. Thus, simply comparing statutory general sales tax rates can paint a misleading picture of the overall level of commodity taxation across the provinces.

To address this issue, Table 2.2 also presents ***average effective commodity tax rates*** for each province. These average effective rates are calculated by taking total commodity tax revenue collected in the province and dividing it by total consumer expenditures net of the taxes. Calculations are presented for the federal government and each province separately. Average effective federal rates vary somewhat across the provinces because the GST is not applied to all expenditures, and spending patterns vary slightly across the provinces.

The effective federal commodity tax rate is about 6%, varying from a low of 5.8% in Ontario to a high of 6.9% in Newfoundland. There is much more variation in provincial effective commodity tax rates. Despite its lack of a sales tax, the effective provincial commodity tax rate in Alberta is still 2.7% because of the presence of various excise taxes. Yet it is by far the lowest effective rate; the next lowest is in B.C. at 5.6%, and the highest is 7.8% in Newfoundland. The average provincial effective commodity tax rate in the rest of the country, not including

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$40,000	11.94	11.00	12.87	15.73	16.22	10.01	15.86	14.95	15.21	17.94	26.00
$50,000	12.86	11.00	12.87	17.60	16.22	12.01	15.86	14.95	16.73	17.94	26.00
$60,000	14.28	11.00	18.66	19.40	17.63	17.42	17.69	16.67	18.66	22.01	29.00
$80,000	14.28	11.00	21.39	19.40	17.63	17.42	17.69	18.34	18.66	22.01	30.45
$100,000	14.28	11.00	21.39	19.40	17.63	17.42	19.10	18.34	18.66	22.01	30.45

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MB	7.0	6.3	7.0	6.6	12.9
ON	7.0	5.8	8.0	6.7	12.5
PQ	7.0	6.2	7.5	6.6	12.8
NB	7.0	6.8	8.0	7.2	14.0
NS	7.0	6.5	8.0	7.3	13.8
PEI	7.0	6.5	8.0	NA	NA
NF	7.0	6.9	8.0	7.8	14.7
Non-Alberta Weighted Average	7.0	6.0	NA	6.6	12.6

Note: The effective commodity tax rate is calculated as total commodity taxes paid divided by the net of tax value of total expenditures, using the SPSD/M database. Federal rates vary across provinces because of different family expenditure patterns. Provincial calculations for PEI are not available.

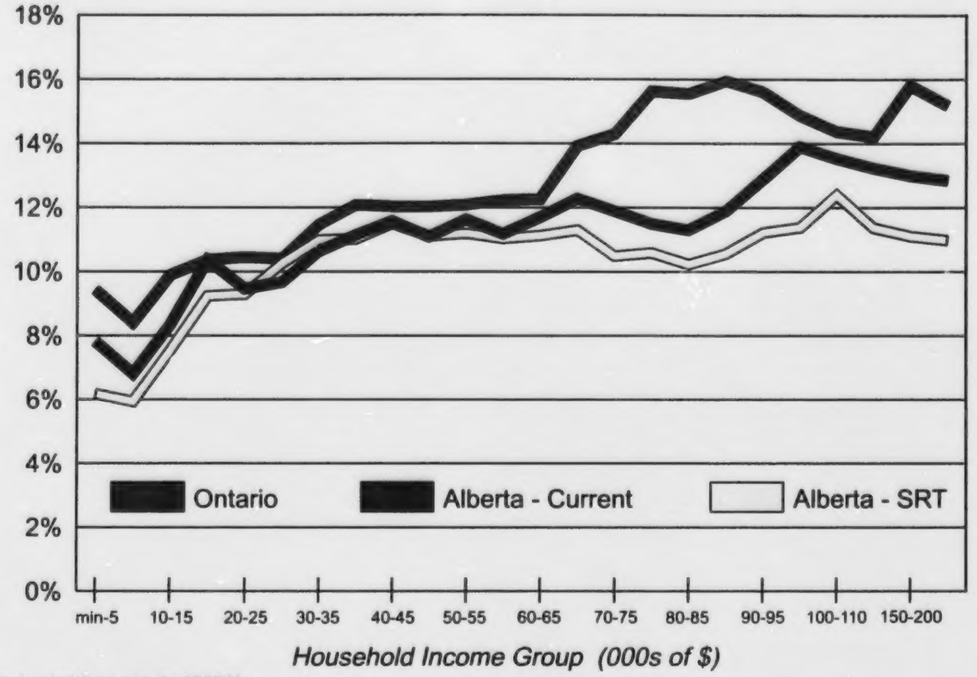
comprehensive base. Three Atlantic provinces (Newfoundland, Nova Scotia and New Brunswick) adopted the federal base under the Harmonized Sales Tax (HST) introduced in 1997. Quebec's provincial sales tax is also largely harmonized with the federal GST. All of the other provinces, with the obvious exception of Alberta, levy single-stage Retail Sales Taxes (RST) that are applied to different, much narrower, bases. Virtually every RST exempts food and most services; many do not tax clothing in general or children's clothing in particular. Also, all provinces, including Alberta, impose special excise taxes on top of any provincial RST on goods such as gasoline, alcohol, jewelry, and hotel rooms. Thus, simply comparing statutory general sales tax rates can paint a misleading picture of the overall level of commodity taxation across the provinces.

To address this issue, Table 2.2 also presents ***average effective commodity tax rates*** for each province. These average effective rates are calculated by taking total commodity tax revenue collected in the province and dividing it by total consumer expenditures net of the taxes. Calculations are presented for the federal government and each province separately. Average effective federal rates vary somewhat across the provinces because the GST is not applied to all expenditures, and spending patterns vary slightly across the provinces.

The effective federal commodity tax rate is about 6%, varying from a low of 5.8% in Ontario to a high of 6.9% in Newfoundland. There is much more variation in provincial effective commodity tax rates. Despite its lack of a sales tax, the effective provincial commodity tax rate in Alberta is still 2.7% because of the presence of various excise taxes. Yet it is by far the lowest effective rate; the next lowest is in B.C. at 5.6%, and the highest is 7.8% in Newfoundland. The average provincial effective commodity tax rate in the rest of the country, not including

Figure 2.1

Weighted Average Effective Provincial Marginal Tax Rates



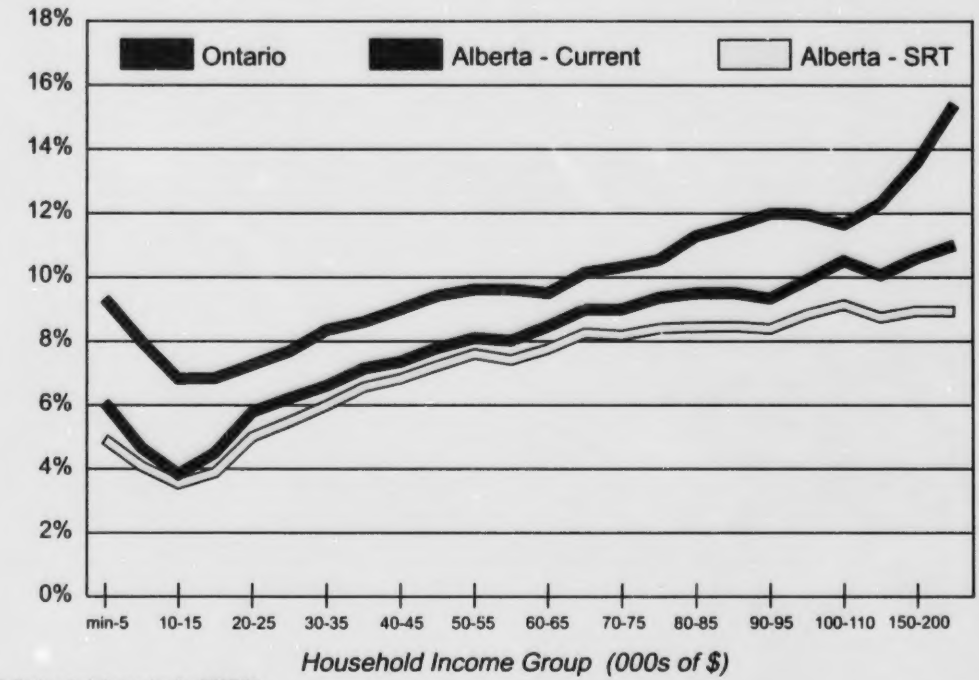
Source: Author's calculations using the SPSD/M.

Alberta, is 6.6%. The combined federal/provincial average effective commodity tax rate in Alberta is 9.2% vs. an average of 12.6% in the rest of the country.

So far, we have looked at income taxes and commodity taxes separately. The two types of taxes, along with various other tax and transfer programs, are included together in Figure 2.1, which shows the ***weighted average effective provincial marginal tax rates*** on employment income for different household income groups.[4] Included in provincial taxes are personal income taxes as well as sales taxes, excise taxes, property taxes, health levies, etc. Household income includes market income from employment and investment plus government transfers. Effective marginal tax rates are shown for Alberta under both the current system and the 11% SRT, and also for Ontario. Ontario is chosen for comparison purposes because the marginal (and average) tax rates in all of the other provinces exceed Ontario. The figure thus indicates the combined income and commodity taxes levied on an additional dollar of employment income for all (simulated) households in Alberta and Ontario.

The figure shows that when all taxes are taken into account, most particularly sales and income taxes, effective marginal tax rates are lower for ***all*** income levels in Alberta than Ontario under both the current Alberta system and the 11% SRT. This is particularly the case for middle and high income households, with incomes in excess of $60,000. The lower effective marginal tax rates in Alberta reflect not only the income

Figure 2.2
Average Effective Provincial Tax Rates



Source: Author's calculations using the SPSD/M.

tax considerations reflected in Table 2.1, but also the lack of a sales tax in Alberta, as it is presumed in the calculations that individuals spend some fraction of an incremental dollar of employment income on goods and services, and thus pay the applicable commodity taxes. Family expenditure and savings patterns are based upon 1992 FAMEX data. Thus, differences in expenditure patterns and savings rates across income groups are reflected in the calculations.

The introduction of the 11% SRT will widen the gap in effective marginal tax rates between Alberta and Ontario. Under the SRT, marginal tax rates will decline relative to the current system in virtually every household income group, and are effectively flat for household incomes in excess of $45,000.

The previous discussion has focused on ***marginal*** provincial tax rates, which, as shall be seen below, are important for the evaluation of the ***efficiency*** aspects of replacing the 11% SRT with a consumption tax. Also of interest are the ***average*** provincial tax rates, which provide an indication of the total tax burden and the distribution of that burden across income groups, and will prove to be important in the evaluation of the ***equity*** aspects of replacing the SRT with a consumption tax. Average tax rates are also an important factor in the determination of tax-induced migration. Average effective provincial tax rates are illustrated in Figure 2.2. The calculations use the same income and tax definitions employed in Figure 2.1.

Looking first at the current tax systems, it is evident that both the Alberta and Ontario personal tax systems are moderately progressive, with average tax rates increasing with income. Under the current Alberta system, after an initially regressive segment, where average tax rates decline with income, the average tax schedule rises from a low of just under 4% of total income to a high of 11% for the highest income group in the figure. For Ontario, the average tax rates rise from just under 7% to a high of just over 15% for the highest income group. Noteworthy, of course, is the fact that the Alberta tax burden is less than the Ontario tax burden for each income group.

The imposition of the SRT will lower the Alberta tax burden even further, for each and every income group. Of note here is that although the ***marginal tax*** rates will rise for some income groups under the SRT (see Table 2.1 and Figure 2.1), average tax rates, and thus the burden of taxes, will decline for all groups. This, of course, is due to the substantial increase in the basic personal exemption that will be introduced as a part of the 11% SRT, and the fact that the SRT coupled with the elimination of the flat tax and the surtax will lower the overall tax take in Alberta by about $600 million. Note also from Figure 2.2 that the average tax rate schedule flattens out slightly under the SRT at the higher income levels, but still maintains a moderately progressive profile (again, because of the exemption); thus the use of the ***single rate tax*** moniker rather than the somewhat misleading ***flat tax***.

As shown above, both average and marginal income tax rates are generally lower in Alberta than in the rest of the country. However, the "Alberta Advantage" in commodity tax rates dwarfs the "Alberta Advantage" in income tax rates. One of the motivating questions behind this study is whether this is the right place for Alberta to build an advantage.

To provide a "close to home" international perspective, Table 2.3 shows the range of statutory personal income tax rates and general sales tax rates in the US. To reiterate the cautionary point from above, these statutory rates are applied to different bases and are therefore not directly comparable. The table is informative nonetheless. Of course, there is no general sales tax levied at the federal level in the US and, as will be discussed below, overall the US relies less on commodity taxes than do most countries, including Canada. However, at the subnational level, forty-five US states and the District of Columbia impose a sales tax, ranging from a low of 3% in Colorado to a high of 7% in Rhode Island and Mississippi. State sales tax rates are generally lower than those imposed in Canadian provinces, with the obvious exception of Alberta. Forty-three states impose personal income taxes, generally at much lower rates than Canadian provinces (two of these, Tennessee and New Hampshire, exempt labour income, imposing the tax only on interest and dividends). Even with the introduction of the 11% SRT, the Alberta income tax rate will just equal the top marginal rate in Montana, the state with the second highest tax rate in the US. It should be noted that although US retail sales tax rates tend to be lower than Canadian rates, they also tend to impose higher taxes on business inputs compared to Canada. This issue will be discussed in the next section.

Although the reliance on sales vs. income taxes varies a lot across the states, it is interesting to note that six states rely exclusively on sales taxes (Florida, Nevada, South Dakota, Texas, Washington, Wyoming) while another nine levy very low income tax rates, with a maximum rate of 5% or less (Alabama, Colorado, Connecticut, Illinois, Indiana, Maryland, Michigan, Mississippi, Pennsylvania). On the other hand, only four states rely exclusively on personal income taxes, levying no

Table 2.3
US State Tax Rates for Tax Year 1999

State	Personal Income Tax (PIT) Rate (%)		Sales Tax Rate (%)
	Low	High	
Alabama	2.0	5.0	4.0
Alaska	no state PIT	no state PIT	no state sales tax
Arizona	2.87	5.04	5.0
Arkansas	1.0	7.0	4.625
California	1.0	9.3	6.0
Colorado	5.0	–	3.0
Connecticut	3.0	4.5	6.0
Delaware	2.6	6.4	no state sales tax
Florida	no state PIT	no state PIT	6.0
Georgia	1.0	6.0	4.0
Hawaii	1.6	8.75	4.0
Idaho	2.0	8.2	5.0
Illinois	3.0	–	6.25
Indiana	3.4	–	5.0
Iowa	0.36	8.98	5.0
Kansas	4.1	6.45	4.9
Kentucky	2.0	6.0	6.0
Louisiana	2.0	6.0	4.0
Maine	2.0	8.5	5.5
Maryland	2.0	4.85	5.0
Massachusetts	5.95	–	5.0
Michigan	4.4	–	6.0
Minnesota	6.0	8.5	6.5
Mississippi	3.0	5.0	7.0
Missouri	1.5	6.0	4.225
Montana	2.0	11.0	no state sales tax
Nebraska	2.62	6.99	4.5
Nevada	no state PIT	no state PIT	6.5
New Hampshire	PIT on dividends and interest	PIT on dividends and interest	no state sales tax
New Jersey	1.4	6.37	6.0
New Mexico	1.7	8.2	5.0
New York	4.0	6.85	4.0
North Carolina	6.0	7.75	4.0
North Dakota	2.67	12.0	5.0
Ohio	0.673	6.799	5.0
Oklahoma	0.5	6.75	4.5
Oregon	5.0	9.0	no state sales tax
Pennsylvania	2.8	–	6.0
Rhode Island	26.5% federal tax liability	26.5% federal tax liability	7.0
South Carolina	2.5	7.0	5.0
South Dakota	no state PIT	no state PIT	4.0
Tennessee	PIT on dividends and interest	PIT on dividends and interest	6.0
Texas	no state PIT	no state PIT	6.25
Utah	2.3	7.0	4.75
Vermont	25% federal tax liability	25% federal tax liability	5.0
Virginia	2.0	5.75	3.5
Washington	no state PIT	no state PIT	6.5
West Virginia	3.0	6.5	6.0
Wisconsin	4.77	6.77	5.0
Wyoming	no state PIT	no state PIT	4.0
District of Columbia	6.0	9.5	5.75

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general sales tax (Montana, Delaware, New Hampshire and Oregon). Alaska imposes neither an income tax nor a sales tax. Notable from Alberta's perspective is the absence of a sales tax in Montana, which is on the southern border of the province. This has implications for cross-border shopping – an issue that will be addressed below. Also notable from Alberta's perspective is Texas, where there is a 6.25% sales tax but no income tax. Alberta and Texas share a common reliance on the oil and gas industry, and there is a sizable flow of executive talent between the two jurisdictions as a result. The absence of an income tax in Texas may thus have implications for the "brain drain," another issue that will be touched upon below.

Table 2.4
Alberta Revenues: First Quarter Forecast, 1999/2000 (millions $)

Personal Income Taxes	4,608
Corporate Income Taxes	1,781
Non-Renewable Resource Revenue	3,306
Transfers from Federal Government	1,590
Investment Income	1,601
Income from Commercial Operations	1,373
Premiums, Fees, Licences	1,346
School Property Tax	1,145
Fuel Tax	550
Tobacco Tax	360
Hotel Room Tax	45
Other	499
TOTAL REVENUE	**18,204**

Source: First Quarter Budget Update, April 1999

2.2 The Tax Mix in Alberta

Now that we have a basic understanding of the structure of personal taxation in Alberta, the question of what all of this implies for the overall mix of taxes in Alberta can be addressed. Table 2.4 shows the current revenue breakdown in Alberta, taken from the First Quarter Budget Update in April 1999.

Table 2.5 provides information on the share of provincial ***own source*** revenue (not including federal government transfers) derived from various sources in Alberta, and for all of the other provinces combined, since 1980. While the tables are self explanatory, several points are worthy of note. First, Alberta generates a disproportionately large share of its revenue from resource revenues. This should be of no surprise – Alberta is a resource rich province that generates a lot of revenue from the oil and gas sector. Note also that the province's reliance on resource revenue has dropped substantially since 1980.

A particularly pertinent comparison is the ***relative*** reliance on personal income taxes rather than sales taxes in Alberta vis-à-vis the other provinces. Sales taxes include both general sales taxes as well as commodity taxes levied on various goods, such as gasoline taxes, liquor taxes, and hotel taxes. For the other provinces in 1997, of the total tax revenue collected from personal income and commodity taxes (what might be thought of as "taxes on persons"), about 60% was collected in the form of personal income taxes and 40% in the form of sales taxes. In Alberta, on the other hand, personal income taxes accounted for almost 80% of "taxes on persons" and sales taxes for only 20%. Although as a whole "taxes on persons" accounted for only 30% of total revenue collected by Alberta in 1997, versus 50% in the other provinces – such are the benefits of living in a resource rich province – the large bulk of those "taxes on persons" were collected in the form of income taxes rather than sales taxes.

Also noteworthy is the trend in the tax mix since 1980. For the rest of Canada, the shares of personal income taxes and commodity taxes have been fairly constant general sales tax (Montana, Delaware, New Hampshire and Oregon). Alaska imposes neither an income tax nor a sales tax. Notable from Alberta's perspective is the absence of a sales tax in Montana, which is on the southern border of the province. This has implications for cross-border shopping – an issue that will be addressed below. Also notable from Alberta's perspective is Texas, where there is a 6.25% sales tax but no income tax. Alberta and Texas share a common reliance on the oil and gas industry, and there is a sizable flow of executive talent between the two jurisdictions as a result. The absence of an income tax in Texas may thus have implications for the "brain drain," another issue that will be touched upon below.

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Also noteworthy is the trend in the tax mix since 1980. For the rest of Canada, the shares of personal income taxes and commodity taxes have been fairly constant

Table 2.5
Tax Mix in Alberta and the Rest of Canada, Share of Own Source Revenue (%)

Alberta

	PIT	*CIT*	*Sales*	*Resource*	*Property*	*Other*
1980	10.3	5.5	0.5	60.5	1.2	22.1
1981	10.8	6.5	0.4	57.1	1.1	23.9
1982	13.5	6.1	0.4	51.7	1.2	27.1
1983	15.0	5.2	0.4	46.4	1.3	31.6
1984	13.4	6.8	1.0	49.1	1.3	28.4
1985	12.5	6.8	0.9	48.9	1.2	29.6
1986	13.3	6.6	0.9	46.7	1.2	31.2
1987	20.7	5.0	1.4	30.1	1.6	41.1
1988	21.4	5.4	3.8	33.0	1.4	35.0
1989	20.1	7.1	5.2	27.8	1.6	36.2
1990	23.2	6.4	5.0	26.8	1.5	37.1
1991	22.4	6.4	5.6	26.0	1.7	37.9
1992	25.2	6.0	6.9	21.1	2.0	38.7
1993	24.5	5.5	7.6	23.3	2.2	36.9
1994	23.1	6.4	6.5	25.4	2.0	36.7
1995	20.3	7.0	5.8	25.9	8.2	32.8
1996	21.4	9.2	5.9	22.3	8.3	32.9
1997	22.8	6.7	6.1	22.6	8.3	33.5

Rest of Canada

	PIT	*CIT*	*Sales*	*Resource*	*Property*	*Other*
1980	27.2	7.1	20.2	15.7	0.5	29.3
1981	27.9	7.5	19.3	15.2	0.5	29.6
1982	29.5	6.6	19.8	12.0	0.8	31.3
1983	30.7	3.8	20.2	11.0	2.1	32.2
1984	28.9	4.5	21.8	11.6	1.7	31.4
1985	27.8	5.1	21.9	11.4	1.7	32.1
1986	28.7	5.2	22.7	10.0	1.4	31.9
1987	30.8	5.3	23.8	5.5	1.3	33.4
1988	31.7	5.8	23.4	6.3	1.2	31.6
1989	31.3	6.3	24.1	5.3	3.6	29.4
1990	31.8	6.1	23.7	5.0	3.7	29.7
1991	34.0	4.7	22.5	4.8	3.9	30.0
1992	33.7	4.3	23.4	4.0	4.2	30.4
1993	32.7	3.8	23.5	4.3	4.6	31.1
1994	32.7	4.3	22.8	5.1	4.4	30.6
1995	31.2	5.3	22.4	6.2	5.1	29.8
1996	31.4	6.5	21.7	5.3	5.0	30.0
1997	31.6	6.3	21.5	5.3	5.1	30.2

PIT = personal income tax. CIT = corporate income tax. Source: Statistics Canada catalogue 13-213, various years.

Table 2.6
International Tax Mix: Percentage of Total Revenue

	Canada		United States		OECD		European Union	
	1980	*1996*	*1980*	*1996*	*1980*	*1996*	*1980*	*1996*
PIT	34.1	37.7	39.1	37.6	31.3	26.8	29.1	26.0
CIT	11.6	8.9	10.8	9.6	7.6	8.2	5.8	7.5
Social Security	10.3	16.0	21.1	23.5	20.2	22.3	27.4	26.4
Commodity	32.6	24.9	17.6	17.2	32.3	32.5	31.0	31.2
Other	11.4	12.5	11.4	12.1	8.6	10.2	6.7	8.9

Source: OECD Taxation Statistics, various years. PIT = personal income tax. CIT = corporate income tax.

from 1980 to 1997, at around 30% for personal income taxes and 20% for sales taxes. In Alberta the story is very different. In more ways than one, 1986 was a watershed year in the finances of the province. Prior to 1986, personal income taxes accounted for about 12% of provincial revenues, sales taxes for under 1%, and resource revenue for around 50%. In 1986 oil prices fell by 37%, eliminating almost overnight $2 billion from the provincial government's coffers. This led to six consecutive deficits in the province, the longest string in the province's history, and a dramatic forty percentage point increase in the net debt/GDP ratio over that six year period. The subsequent fiscal turnaround engineered by the Klein government, elected in 1993, has been well documented (see Bruce, Kneebone and McKenzie 1998). Receiving less attention, but of more interest for purposes of this study, is the fact that the share of provincial revenues raised from resource royalties fell by almost seventeen percentage points from 1986 to 1987. The share of provincial revenues from personal income taxes likewise rose by seven percentage points in 1987, to about 20%, and has stayed there ever since. The share of sales taxes remained virtually unchanged in 1987, at about 1%, but has since drifted up to account for about 6% of provincial revenues as resource revenues have eroded even further. As an aside, note that in 1995 the provincial government in Alberta started collecting the public school boards' share of property taxes as a part of funding reforms in education; this accounts for the increased share of property taxes from around 2% to over 8% in 1995.

The above tables show that Alberta relies more on personal income taxes relative to commodity taxes than other Canadian provinces. What about internationally? Table 2.6 compares the tax mix in Canada to the US, OECD average, and European Union average. The calculations include both national and sub-national governments. It has been established that within Canada, Alberta relies more on personal income taxes and less on commodity taxes than do the other provinces. It turns out that in an international context, the same can be said of Canada as a whole; the percentage of revenue raised from personal income taxes is much higher than, and the percentage raised from consumption taxes much lower than, the OECD and European Union average.

Canada's tax mix is more similar to the US, where personal income taxes are also relied upon heavily. The important difference between Canada and the US is that the US relies relatively more on Social Security payroll taxes, and less on commodity taxes, than does Canada. In section 3, different approaches to consumption taxation will be discussed. There it will be pointed out that payroll taxes can be considered a special type of

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CIT	11.6	8.9	10.8	9.6	7.6	8.2	5.8	7.5
Social Security	10.3	16.0	21.1	23.5	20.2	22.3	27.4	26.4
Commodity	32.6	24.9	17.6	17.2	32.3	32.5	31.0	31.2
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3. Income Versus Consumption Taxation: An Overview of the Issues

The question of the appropriate tax mix in Alberta boils down to a debate over the relative merits of income vs. consumption as a tax base. Before evaluating the issue from the specific perspective of Alberta, it will prove useful to provide a general overview of various issues related to the taxation of income vs. consumption in order to establish an analytical framework for the discussion in the remainder of the study. The purpose of this section is thus to "plant the seeds" for some ideas, issues, and concepts that will be "harvested" in subsequent sections. As such, many ideas will be perfunctorily introduced with an eye to exploring them in more detail in subsequent sections.

To begin the discussion of income versus consumption as a tax base it is useful to consider the following fundamental identity:

Comprehensive Income = Comprehensive Consumption
+ Comprehensive Saving

This identity follows from the fact that individuals have only two basic things that they can do with any income they earn: they can spend (consume) it, or they can save it. Note the extensive use of the qualifier "comprehensive." While conceptually income, consumption and savings should all be measured on a "comprehensive" basis, this is in fact a fairly ill-defined term in the public finance literature. For example, there is some debate as to how to treat bequests under both a "comprehensive" income and consumption tax. In the identity, income is supposed to include income from all sources – labour income, investment income, and even imputed, or non-market income. Similarly, consumption is presumed to include the consumption of all goods and services, including imputed consumption. Savings is presumed to include savings of all types, and more generally should be thought of as the net change in wealth. Thus, savings includes any change in the net value of assets held by the individual.

This simple identity suggests several differences between using income and consumption as the basis for taxation. First, the identity emphasizes that the fundamental difference between an income tax and a consumption tax is that the former taxes savings while the latter does not. Second, it is clear that if savings are positive, which they are in aggregate, a tax imposed on a comprehensive income base at some rate will raise more revenue than a tax imposed on a consumption tax base at the same rate. In other words, the comprehensive income base is larger than the comprehensive consumption base. This means that if a comprehensive consumption tax is going to raise the same revenue as a comprehensive income tax, it must be imposed at a higher tax rate. The implications of this will be discussed later.

The identity also suggests that there are several ways of imposing a tax on consumption. Indeed, consumption taxes are generally divided into two broad classes: ***direct consumption taxes*** and ***indirect consumption taxes***, each of which may in turn be divided into (at least) two categories (discussed below).

When addressing the issue of the appropriate tax base, and therefore tax mix, economists typically invoke three criteria: efficiency, equity, and administrative and compliance costs. A brief discussion of efficiency and equity considerations will be presented here. A discussion of administration and compliance is reserved for section 5.

3.1 Efficiency

Efficiency has to do with how well resources are allocated amongst the various competing uses in the economy. Prices play a key role in a market economy in the allocation of resources. In the absence of distortions, or market failures, prices ensure that resources are allocated to the uses in which they are most valued, subject, of course, to technological and budget constraints. Taxes give rise to efficiency costs by distorting prices – changing relative prices in the economy – which causes a misallocation of resources away from their most valuable uses. The efficiency costs that arise because of tax induced changes in relative prices are equivalent to a reduction in real income in the economy. One of the objectives of tax policy is to choose the mix of taxes that minimizes efficiency costs in the economy.

Both income and consumption taxes generate efficiency costs by distorting prices. An income tax generates distortions in two markets – the labour market and the capital market. Income taxes distort the labour market by lowering the after-tax wage rate, which lowers the price of leisure relative to other goods in the economy, and therefore distorts labour supply decisions. Income taxes also distort the capital market by lowering the after-tax rate of return to savings, which changes the price of present consumption relative to future consumption, which distorts savings decisions.

A consumption tax, on the other hand, generates a distortion in only one market, the labour market. Since consumption taxes differ from income taxes in that they do not tax the returns to saving, a consumption tax is similar to a tax on labour income alone, and therefore generates similar distortions in the labour market to an income tax.

The ***number*** of markets distorted does not matter in the determination of the efficiency costs of the tax system; rather, what is relevant is the total ***size*** of the efficiency costs. Although consumption taxes do not distort savings decisions, the labour market distortion under a comprehensive consumption tax is higher than under a comprehensive income tax. This is because the size of the distortion in any particular market, and therefore the magnitude of the associated efficiency cost is proportional to the ***square*** of the tax rate in that market. Thus, efficiency costs increase more than proportionately with increases in the tax rate. As discussed above, the consumption tax rate must be higher than the income tax rate in order to raise the same revenue (because the consumption base is smaller than the income base), which means that, when both bases are comprehensive, a consumption tax will create a larger labour market distortion than will an income tax. All of this suggests that theoretical arguments cannot be used to determine which tax base is preferred on efficiency grounds; we must rely on empirical calculations of the efficiency costs associated with various tax mixes.

Table 3.1

Indirect Consumption Taxes: Example

	Manufacturer	***Wholesaler***	***Retailer***	***TOTAL***
Transactions				
1. Sales	$300	$700	$1,000	$2,000
2. Purchases	$0	$300	$700	$1,000
3. Value-added	$300	$400	$300	$1,000
10% RST				
4. Retail Sales	$0	$0	$1,000	$1,000
5. RST	$0	$0	$100	$100
10% VAT				
6. Tax on Sales	$30	$70	$100	$200
7. Tax on Purchases	$0	$30	$70	$100
8. VAT	$30	$40	$30	$100
10% BTT				
9. Sales	$300	$700	$1,000	$2,000
10. Purchases	$0	$300	$700	$1,000
11. Value-added	$300	$400	$300	$1,000
12. BTT	$30	$40	$30	$100

RST = retail sales tax. VAT = value-added tax. BTT = business transfer tax.

Aside from the tax rates, key considerations in the calculation of efficiency costs are the sensitivity of labour supply and savings decisions to their relevant after-tax prices, as measured by their elasticities. The more sensitive labour supply is to changes in the after-tax wage rate, the greater the efficiency cost in the labour market. Similarly, the more sensitive saving is to the after-tax interest rate, the greater the efficiency costs in the capital market. Efficiency cost estimates for the labour market thus depend upon the elasticity of labour supply, while efficiency cost estimates for the savings market depend upon the elasticity of the supply of savings. As will be discussed in more detail in section 4, the efficiency cost of income and consumption taxes also depends upon the interaction between labour supply and savings decisions. For example, a tax on savings might cause workers to supply more labour, thereby offsetting some of the efficiency costs caused by the distortion to the savings decision. However, since we know very little about the direction and magnitude of these interaction effects, they are often ignored.

Consumption taxes can take many forms, which are theoretically equivalent under some circumstances. There are two broad types of consumption taxes: indirect consumption taxes and direct consumption taxes. Indirect consumption taxes can in turn take several forms, including the single stage retail sales tax (RST), the multi-stage credit and invoice value-added tax (VAT), and the subtraction method business transfer tax (BTT). Table 3.1 illustrates, using a simple example, how these three different approaches to indirect consumption taxation work.

The key difference between a credit and invoice VAT and a RST is that the former is applied to the value-added at each stage in the production/distribution process, while the latter is applied only at the final, retail stage. While in this simple example they generate the same total tax revenue, in practice the two taxes can give rise to quite different outcomes. Indeed, the table is somewhat misleading in this regard. This is because the RST as a single stage tax is difficult to apply only to final consumption expenditures, as some of the tax inevitably ends up being paid by other businesses. Kuo, McGirr and Poddar (1988) estimate that about one-third of the "retail" sales taxes applied by Canadian provinces are actually applied to business inputs. This results in tax cascading as these businesses in turn levy RST on their sales. The credit and invoice VAT, on the other hand, explicitly levies the tax on business inputs but then rebates the tax via a credit for taxes paid on purchases. This is accomplished by recording the taxes paid on all sales invoices. Businesses then submit a record of those invoices to receive a credit for taxes paid on their purchases which is applied to the taxes they collect on their sales on behalf of the government; thus the name, ***credit and invoice*** VAT. By charging and then rebating (crediting) taxes paid on purchases, the credit and invoice VAT removes all taxes imposed on business inputs. The tax is therefore imposed only on final consumption expenditures by individuals and not on business inputs. For this reason, most economists argue that a VAT is superior to an RST. Indeed, the VAT has become the "tax of choice" on the international scene for precisely this reason.

Five Canadian provinces (British Columbia, Saskatchewan, Manitoba, Ontario and Prince Edward Island) levy a RST. However, these provincial RSTs are not levied on a comprehensive consumption base, which includes all consumption expenditures. Rather there are typically exemptions for most services and many goods, such as food and clothing. Indeed, the RST bases vary considerably across the provinces. This variation in RST rates levied on different goods and services is another source of inefficiency introduced by the tax system. The federal government's Goods and Services Tax (GST) is a credit and invoice value-added tax. It is levied on most goods and services in the economy with only a few exceptions, most notably grocery food. The federal GST applies to approximately 85% of expenditures on goods and services in Canada.

There are four exceptions to the use of the RST for the Canadian provinces that levy a general sales tax. Quebec has a provincial VAT that is largely harmonized with the federal GST. Similarly, three Atlantic provinces (New Brunswick, Nova Scotia, and Newfoundland) recently adopted a sales tax fully harmonized with the GST, the Harmonized Sales Tax (HST). There are some important differences between the approach to harmonization embodied in the Quebec tax and the HST, particularly in terms of administration. These will be discussed in section 5.

The subtraction method BTT is a value-added tax that is calculated in a different way than the credit and invoice VAT, but with the same effect. Rather than keeping track of sales taxes paid on purchases via sales invoices, businesses simply subtract total business purchases from total sales for the year to determine value-added at each stage in the production and distribution process. While the BTT offers several administrative advantages over the credit and invoice VAT, most countries have opted for some variation of the latter because of the ability to either exempt some goods and services completely from the tax (such as grocery food), or impose differential VAT rates.

The direct approach to consumption taxation takes advantage of the fundamental identity presented above, which may be rewritten as follows:

$$\textit{Consumption} = \textit{Income} - \textit{Savings}$$

Table 3.2
Direct Consumption Taxes: Example

An individual earns $10,000 for each of two years, saves $2,000 in the first year and withdraws and consumes savings plus interest in the second year. The tax rate is 25% and the rate of return on savings is 10%.

	Income	Saving	Tax Base	Taxes Paid
Registered Approach				
Year 1	$10,000	$2,000	$8,000	$2,000
Year 2	$10,000	-$2,200	$12,200	$3,050
Present value of taxes: $2,000 + $3,050/1.1 = $4,773				
Pre-paid Approach				
Year 1	$10,000	$2,000	$10,000	$2,500
Year 2	$10,000	-$2,200	$10,000	$2,500
Present value of taxes: $2,500 + $2,500/1.1 = $4,773				

There are two approaches to direct consumption taxation: the registered approach, often called the ***Registered Personal Expenditure Tax*** (RPET); and the pre-paid approach, often referred to as the ***Pre-paid Personal Expenditure Tax*** (PPET).

The RPET employs the above version of the identity directly. Individuals measure their income in the year from all sources, subtract any saving in "registered assets," and add any withdrawals. This means that capital income accruing in "registered accounts" (interest, dividends, capital gains, etc.) is not taxed until withdrawn for consumption. By way of contrast, the PPET simply exempts all capital income from taxation explicitly. There is no deduction for saving, but income from interest, dividends and capital gains is simply not taxed at all. As such, a PPET acts essentially as a tax on labour income alone. An example of PPET treatment in the current tax system is the treatment of owner occupied housing. When individuals buy their house they receive no deduction. If they sell it for more than they bought it for, the resulting capital gain is not included in income for tax purposes.

The PPET is equivalent to the RPET in present value terms – i.e., the present value of the tax liability is the same under both taxes. This is illustrated in the example given in Table 3.2. The example also illustrates why the PPET is ***pre-paid***. Although it is equivalent to the RPET in ***present value terms***, more taxes are paid in the first year than under the RPET. It is in this sense the PPET results in the pre-payment of taxes.

It was indicated above that the fundamental difference between income and consumption taxes is that the former taxes the return to savings while the latter does not. It is obvious why indirect consumption taxes, like the RST or VAT, which are levied on consumption expenditures, do not tax the return to savings. It is also easy to see that the PPET, which explicitly exempts capital income from its base, does not tax the return to capital. The non-taxation of capital income under the RPET may be less clear. To see how the RPET effectively exempts capital income from taxation, consider the following simple example. Take an individual who makes a $1 contribution to a registered RPET account and withdraws it and the accumulated interest one year later. $1 saved in this manner reduces consumption in the first period by \$(1-m), where m is the individual's marginal tax rate. Consumption declines by less than \$1 because under the RPET approach the individual receives a tax deduction of contributions to registered assets. When the \$1 plus interest is withdrawn one year later, future consumption is increased by \$(1+i)(1-m) where i is the interest earned on the \$1; this is because withdrawals from registered accounts are fully taxed under the RPET. The after-tax rate of return on the \$1 saved over this period is equal to the after-tax cost of the investment, \$(1-m), minus the after-tax return, \$(1+i)(1-m), all divided by the after-tax cost, or $[(1-m)-(1+i)(1-m)]/(1-m)=i$, which is simply the before-tax rate of interest. Thus, under the RPET the before-tax rate of return on a registered investment is exactly the same as the after-tax rate of return, which means that capital income from savings that occurs in this form effectively goes untaxed.

It is obvious from this example, and the description of the RPET, that the treatment of savings under an RPET is virtually identical to that allowed under the income tax in Canada for Registered Retirement Savings Plans (RRSPs) and Registered Pension Plans (RPPs) – contributions are tax deductible, the rate of return accrues tax free, and withdrawals are fully taxed. Indeed, were it not for the imposition of limits on contributions to RRSPs and RPPs, the ***income*** tax in Canada would really be a ***consumption*** tax of the registered type. Because of the generosity of the RRSP/RPP contribution limits in Canada, the minimum of \$13,500 or 18% of income in the simplest case, the Canadian income tax system effectively ***is*** a registered direct consumption tax for many low and middle income Canadians. There are other features of the Canadian tax system that resemble the pre-paid approach to direct consumption taxation, for example the non-taxation of capital gains realized on housing (for a principal residence). This turns out to be an important issue, which will be revisited below in the discussion of taxation and savings in section 4.

3.2 Equity

It has been established that theoretical arguments alone cannot be used to favour either income or consumption taxation on efficiency grounds. The equity aspects of the income vs. consumption taxation debate are no less difficult to resolve, as one person's evaluation of the fairness of the tax system may differ markedly from another person's evaluation. Indeed, like efficiency, arguments can be made in favour of both income and consumption taxation on equity grounds.

Economists typically invoke two concepts to sharpen the analysis of fairness and equity. They are the notions of ***horizontal*** and ***vertical*** equity. Horizontal equity concerns the treatment of individuals in similar economic circumstances by the tax system, while vertical equity concerns the treatment of individuals in different circumstances. Horizontal equity considerations suggest that individuals who have an equal ability to pay taxes should pay the same amount of taxes, while vertical equity suggests that individuals with a greater ability to pay should pay more taxes than those with a lower ability to pay. Each concept is considered in turn, starting with horizontal equity.

Horizontal equity considerations are periodically invoked to argue that all individuals who earn the same amount of income in a particular year, regardless of the source of that income and regardless of whether the income is spent or saved, should pay the same taxes – people in similar economic circumstances should be treated in a similar way by the tax system (bear a similar tax burden). This would suggest that income taxation is superior to consumption taxation on horizontal equity grounds, because a comprehensive income tax would tax all sources of income – from labour, interest, dividends, capital gains (and losses), etc. – in the same way.

The counter argument is that this is a very narrow interpretation and application of the concept of horizontal equity. Many economists argue that ***annual*** income is a flawed indicator of an individual's economic circumstances. A more reasonable indicator of an individual's well being is the income earned over her lifetime, measured in present value terms. Applying the concept of horizontal equity from this perspective would suggest that individuals who have similar present value lifetime incomes should be treated in a similar fashion by the tax system – i.e., they should pay a similar amount of taxes, in present value terms, over their lifetimes. Income taxes violate this notion of horizontal equity while consumption taxes do not. By taxing the return to savings, income taxes discriminate against individuals who have a preference for saving. Therefore, two individuals who have the same present value incomes over their lifetimes, but have different preferences for saving, will bear different tax liabilities under an income tax. Under a consumption tax, on the other hand, the lifetime tax burden is independent of one's taste for saving. This is illustrated via the simple example shown in Table 3.3.

Table 3.3

Horizontal Equity: Saver vs. Spender

Two individuals each live for two periods. They have identical fixed labour incomes of $10,000 in the first period and $0 in the second period. Person A, the Saver, has a preference for saving, and saves $4,000 in period 1 to consume in period 2. Person B, the Spendthrift, has a lower taste for saving, and saves only $2,000 in period 1 to consume in period 2. The interest rate is 10%. Both the income tax and the consumption tax are 25%.

Income Tax	***Year 1***	***Year 2***	***Present Value***
Saver	$2,500	$100	$2,590.91
Spender	$2,500	$50	$2,545.45
Consumption Tax	***Year 1***	***Year 2***	***Present Value***
Saver	$1,500	$1,100	$2,500
Spender	$2,000	$550	$2,500

The example considers two individuals who are identical in every way with the exception that one of the individuals, person A, has a preference for saving while the other individual, person B, is somewhat less inclined in that regard. That is to say, person A values future consumption relative to current consumption more than does person B. Other than their different preferences for saving these two individuals are identical – they have the same ability and opportunities, and therefore earn the same wages in the labour market. To keep things simple, the example considers only a two period environment where persons A and B both earn $10,000 in labour income in the first year and none in the second year. This can be thought of as a simplified representation of a standard life-cycle model whereby individuals work and save for the first part of their lives and retire in the latter part of their lives. Person A saves $4,000 in year one for "retirement," person B saves $2,000. The interest rate earned on savings is 10% for both individuals. Clearly, these individuals have identical "economic circumstances" – earning the same labour income and with the same access to the capital market – they differ only in their preferences.

Consider a comprehensive income tax that taxes all sources of income at the same rate regardless of its source – in this case labour income in year one and interest income in year two. Say the income tax rate is 25%. The first panel in Table 3.3 shows the income taxes the two individuals pay in each year, and the present value of those income taxes. It is clear that, despite the fact that the present value of their consumption expenditures is identical, person A, the "saver," pays more income taxes in present value terms than does person B, the "spendthrift."

Now consider a consumption tax of 25% levied on total expenditures in each period. The bottom panel of Table 3.3 shows the consumption taxes the two individuals pay in each year, and the present value of those taxes. Under the consumption tax, both the "saver" and the "spendthrift" pay the same present value taxes. For our purposes, it doesn't matter that the present value of the consumption taxes in panel B is less than the present value of the income taxes in panel A. Indeed, we would expect this from the previous discussion. Rather, what is important from a horizontal equity perspective is that the consumption tax treats "likes alike" while the income tax does not. The two individuals are identical in every way, in particular in their economic circumstances and opportunities, with the only exception that their preferences differ. The income tax discriminates against individuals who have a preference for saving, which is as arbitrary as discriminating against people who have a preference for chocolate over strawberry ice-cream, and is therefore "unfair" from a horizontal equity perspective.[5]

In many ways, vertical equity considerations are even more difficult to evaluate. Vertical equity has to do with the distribution of the tax burden among individuals in different economic circumstances. It typically manifests itself in the idea that people in favourable economic circumstances should bear more of the tax burden than people in less favourable circumstances. Two issues complicate any assessment of vertical equity. The first concerns exactly how much "more" of the tax burden should be borne by individuals in "more" favourable economic circumstances – proportionately more, progressively more? And if the latter, what should the "degree of progressivity" (somehow defined) be? Individuals who consider themselves to be very fair minded and sensitive to distribution concerns can differ substantially on these points. The second issue involves the same question raised in the assessment of horizontal equity – exactly how should "economic circumstances" be measured and, in this context, how does one determine whether one individual's economic circumstances are more or less favourable than another's? As above, many commentators are wont to interpret "economic circumstances" as annual income from all sources. However, some of the difficulties that can arise from this rather narrow interpretation have already been seen. Many economists argue that (present value) lifetime income is a better metric of "economic circumstances" and well being than is annual income, and that this is the metric that should be used when assessing both the horizontal and vertical equity implications of any change in the tax system.

Public discussions of the vertical equity of the tax system often boil down to a debate over the appropriate "degree of progressivity" of the tax system. Although there is no generally accepted measure of the "degree of progressivity," a commonly used, and simple, approach is to focus on the average effective tax rate, which is simply the total taxes an individual pays divided by some measure of total income. As mentioned above, there are good reasons to use present value lifetime measures for both taxes and income, but precluding that an annual measure will have to suffice. A tax system is said to be ***proportional*** if the average tax rate is the same over all income levels, it is said to be ***progressive*** if the average tax rate increases with income, and it is said to be ***regressive*** if average tax rate declines with income. Progressive tax systems do not need to have ***marginal*** tax rates that rise with income. For example, the Alberta SRT will levy a flat 11% tax on all taxable income in excess of $11,620, which means that the average tax rate will rise with income (this is referred to as linear progressive tax). Indeed, this was shown in Figure 2.2 in the previous section, which illustrated the average tax rates in Alberta under both the current system and the SRT.

Measured on an annual basis, most studies show that indirect consumption taxes like sales taxes tend to be regressive, with the average sales tax rate falling with income, simply because low income individuals tend to spend a greater proportion of their income than do higher income individuals. However, measured on a lifetime basis, the regressivity of sales taxes tends to be much less pronounced, as individuals have a tendency to move through different annual income groups over their life cycle. Moreover, consumption taxes look less regressive on a lifetime basis because savings is really just deferred consumption, which suggests that in a way taxes on consumption are like deferred income tax taxes. For example, a study by Davies (1992) compares the lifetime approach to evaluating the degree of progressivity to an annual approach and shows that sales taxes are much less regressive using a lifetime approach. Income taxes in Canada, on the other hand, tend to be progressive, with average tax rates rising with income. This is due not only to rising marginal tax rates, but also because of the existence of the basic personal credit, which acts effectively as a tax exemption. Most studies show that, when ***all*** taxes are taken into account (not just income and consumption taxes), Canada has a roughly proportional or just slightly progressive tax system, with a relatively flat average tax rate structure after about $35,000 in income (see Vermaeten, Gillespie and Vermaeten 1995).

One way of addressing the common argument that indirect consumption taxes are regressive, and therefore vertically inequitable, is to impose differential tax rates on different commodities (lower tax rates on food, basic necessities, etc., and higher tax rates on luxury items). This is the approach followed by many provinces in their RST systems and is the reason for the non-taxation of things like grocery food and medical supplies under the federal GST. The problem with this is that it creates additional distortions by changing relative prices in the economy and also increases administrative and compliance costs. Thus, there is often a trade-off that must be made between equity and efficiency and administration costs.

Another way of dealing with the potential regressivity of indirect consumption taxes is through the use of other aspects of the tax/transfer system. For example, transfers or tax credits which are phased-out as income rises can be used to moderate the regressive impact of sales taxes. This is the approach taken by the federal government in its refundable sales tax credit. As with the exclusion of certain goods and services under indirect consumption, the use of income sensitive tax credits and/or transfers can also have important efficiency implications. This issue will be discussed in an Alberta context in section 5.

Vertical equity concerns are more easily addressed under direct consumption taxes (RPET and PPET), as they can, for example, be made progressive by introducing general exemptions (e.g., first $10,000 of consumed income tax free), levying a progressive rate, and/or allowing special deductions (e.g., medical expenses). Of course any attempt to increase the progressivity of the tax system to deal with vertical equity considerations will necessarily create higher (implicit or explicit) tax rates, which will decrease the efficiency of the tax system. Thus, in a theme that will be returned to in-depth later on, there may be a trade-off between equity and efficiency considerations.

4. Replacing the Alberta Income Tax with an Alberta Sales Tax

The previous section showed that there are two broad types of consumption taxes – direct consumption taxes, which can be achieved either by the deduction of savings in registered accounts or by the explicit exemption of capital income from taxation, and indirect consumption taxes, which effectively tax consumption transactions as they occur. Indirect consumption taxes can in turn take two basic forms, a multistage value-added tax like the GST, or a single stage retail sales tax like some provincial sales tax systems in Canada. Although there are important differences among them, all consumption taxes share the characteristic that they somehow exempt normal capital income from taxation; indeed, that is what ultimately differentiates a consumption tax from an income tax. Moreover, in broad terms and again with important exceptions, much of the discussion regarding the equity and efficiency of consumption taxation applies to all types of consumption taxes. With all of this in mind, in this section an assessment of a particular type of consumption tax to replace the provincial personal income tax in Alberta will be undertaken: a general sales tax, referred to as the ***Alberta Sales Tax*** (AST).

Before proceeding to an assessment of a general sales tax in Alberta, it should be pointed out that many of the results that follow are based on simulations and calculations using Statistics Canada's Social Policy Simulation Database and Model (SPSD/M). The SPSD/M is a powerful simulation model that represents and statistically extrapolates in considerable detail most of the relevant tax and transfer programs at both the federal and provincial level for 2.788 million "statistical individuals" in Alberta. For the most part, the model is set up as a "cash flow" type simulation model, although behavioural changes can be introduced into the simulations by altering the underlying data in the appropriate manner; that is what is done here.

Finally, it is important to emphasize that the calculations presented below should be considered "rough approximations," both because of their partial equilibrium nature and because of the inevitable shortcomings that accompany any simulation exercise of the type undertaken here. Of particular note in this regard are the revenue implications of various AST/SRT and tax cut scenarios simulated in this section and the next. These simulations will inevitably be less precise, and therefore give different answers, than those that could be undertaken by, say, Alberta Treasury, because of the shortcomings of the SPSD/M data and the government's access to better information.

4.1 What Would a Revenue Neutral Alberta Sales Tax Look Like?

It is presumed that the AST that would completely replace the personal income tax in Alberta would be an indirect value-added tax, harmonized with and levied on the same base as the federal GST. As discussed above, the GST is a broad based multi-stage value-added tax (VAT) of the credit and invoice type that applies to most goods and services. The reason for favouring a VAT at the provincial level rather than a single stage retail sales tax (RST) is based upon the taxation of business inputs associated with a RST. Single stage retail sales taxes inevitably end up taxing business inputs to some degree. Estimates by Kuo, McGirr and Poddar (1988) suggest that about one-third of the retail sales taxes levied by the provinces end up being applied to business inputs. The taxation of business inputs under a RST generates several inefficiencies that can be avoided with a VAT. Production inefficiencies emerge because some business inputs are taxed at higher rates than others, causing firms to change their production processes.

Particularly important in this regard is the taxation of certain types of capital equipment under the RST, which discourages investment. A related issue concerns the extent to which the taxes on business inputs under the RST impinge differentially on inputs in different industries. This imposes additional efficiency costs and "unlevels" the playing field across sectors. The taxation of business inputs also gives rise to tax cascading as retail sales taxes are in turn imposed on goods produced by inputs already subject to the tax. Finally, taxing business inputs increases the price of provincial exports, both internationally and to other provinces, which impinges upon the competitiveness of goods produced in the province. For these reasons, four Canadian provinces have opted to abandon their use of single stage retail sales taxes in favour of a value-added approach, which removes the tax on all business inputs. Quebec has imposed a "dual" VAT that parallels the federal GST, while the Harmonized Sales Tax (HST) in the Atlantic provinces is fully harmonized with the GST.

This study is primarily concerned with the broad economic implications of changing the tax mix in Alberta in favour of consumption taxation. Although some implementation and administrative issues will be dealt with later in the study, many "technical" details associated with imposing an AST to replace the personal income tax in Alberta would need to be worked out prior to implementation. While there is no doubt that in taxation "the devil is in the details," an understanding of the broad economic implications of introducing such a tax to eliminate the provincial income tax in Alberta must be understood before moving to specific implementation issues. That is the primary purpose of this study.

The simulations suggest that, once anticipated behavioural adjustments in labour and savings markets are taken into account, an AST of about 9.5% (9.45% in the simulations) levied on the federal GST base would fully replace the tax revenue generated by the 11% SRT. Thus, a 9.5% AST would "buy" the complete elimination of Alberta's share of the personal income tax.[6] This would give Alberta one of the highest sales tax rates in the country if implemented. Given the elimination of the province's share of the personal income tax, this may or may not be problematic. Nonetheless, several alternatives that would lower the sales tax rate to a level comparable to most of the other provinces are discussed in section 5.

As discussed above, associated with the federal GST is a refundable sales tax credit designed to moderate the impact of the GST on low income Canadians. The revenue neutral AST rate of 9.5% presumes that a similar program would ***not*** be coupled with the introduction of an AST in Alberta. This is in order to undertake a "clean" analysis of the efficiency and equity implications of replacing the income tax with an AST. If a refundable tax credit were to be introduced in Alberta in conjunction with the AST, the revenue for this program would have to come from somewhere, for example from a higher AST rate, the maintenance of an income tax at a lower rate, or simply a tax cut. Various possibilities in this regard are discussed in section 5.

4.2 Efficiency Implications

As discussed in section 3, the relative efficiency cost of income vs. consumption as a tax base is theoretically ambiguous. Thus, empirical analysis is required to determine the efficiency implications of substituting a consumption tax for an income tax.

There are several issues that complicate an analysis of the efficiency implications of moving to a greater reliance on consumption taxes; foremost among these are general equilibrium considerations that link capital and labour markets. A full blown dynamic general equilibrium model is beyond the scope and resources of this study. Rather, a "piece-meal" approach will be taken that looks at various efficiency issues from a partial equilibrium perspective, considering the labour and capital markets in isolation of each other, although some partial linkages are allowed for. While the partial equilibrium approach used here ignores general equilibrium linkages that could be important, it does have the merit of being (relatively) simple and straightforward while still yielding some important insights. Moreover, what general equilibrium studies provide in terms of interactive effects, they typically give up in terms of capturing the minutia of the tax and transfer system, which can also be very important. The partial equilibrium approach utilized here has the merit of incorporating many of these important details into the analysis, and capturing them in the efficiency calculations.

The Labour Market

To begin the analysis of the efficiency implications in the labour market of replacing the provincial income tax in Alberta with a sales tax, the concept of the ***marginal cost of public funds*** (MCF) is employed. The MCF is the economic cost of raising one additional dollar of tax revenue, measured in terms of the reduction in after-tax private sector income, due to a small increase in the rate of tax under consideration. The reduction in private sector income consists of the one dollar in tax revenue raised by the tax increase and transferred to the public sector ***plus*** any efficiency cost associated with the tax increase. The efficiency cost of the tax is the effective reduction in net income that arises because the increase in the tax rate distorts economic decisions, in this case labour supply decisions, by changing relative prices, in this case the wage rate (relative to the cost of consumption). The efficiency cost associated with raising an additional dollar of tax revenue is called the ***marginal efficiency cost*** (MEC) of the tax. The marginal cost of public funds associated with a particular tax is therefore one plus the marginal efficiency cost, or MCF=1+MEC. Thus, the lost income to the private sector associated with a $1 increase in tax revenue exceeds the revenue raised by the tax if the MEC is positive.

By comparing the MCF of different types of taxes, the efficiency implications of changing the tax mix ***at the margin and in a revenue neutral fashion*** can be determined by undertaking the following type of conceptual experiment. Say it is determined that the MCF associated with a tax on some base, base A, is $1.15. This means that raising one more dollar in tax revenue by increasing the tax rate on base A by a small amount will result in a loss in private sector income of $1.15 – the $1 in tax revenue paid to the government plus $0.15 in lost income due to the MEC associated with raising the tax rate. Say the MCF associated with a tax on another base, base B, is $1.20. The concept of the MCF cuts both ways. It also means that the total ***increase*** in private sector income associated with ***lowering*** tax revenue by $1 can exceed the tax revenue forgone. In this case private sector income increases by $1.20 if tax revenues from base B are reduced by $1. When the MCF differs among tax bases, it suggests the possibility of a revenue neutral change in the tax mix that would lower the efficiency costs of the tax system. In this example, a small reduction in the tax rate on base B that costs the government one dollar in forgone revenue will increase net private sector income by

\$1.20. Raising the tax rate on base A by a small amount so as to generate an additional dollar in tax revenue in order to compensate for the dollar forgone from tax B, so there is no change in total government revenue, will reduce net private sector income by \$1.15. The net impact on private sector income is a gain of \$0.05 (\$1.20 gained from cutting the tax on B minus \$1.15 lost from increasing the tax on A). Thus, when the MCF differs among tax bases, a revenue neutral change in the tax mix can be made ***at the margin*** that lowers the total efficiency costs associated with the tax system and effectively increases income.

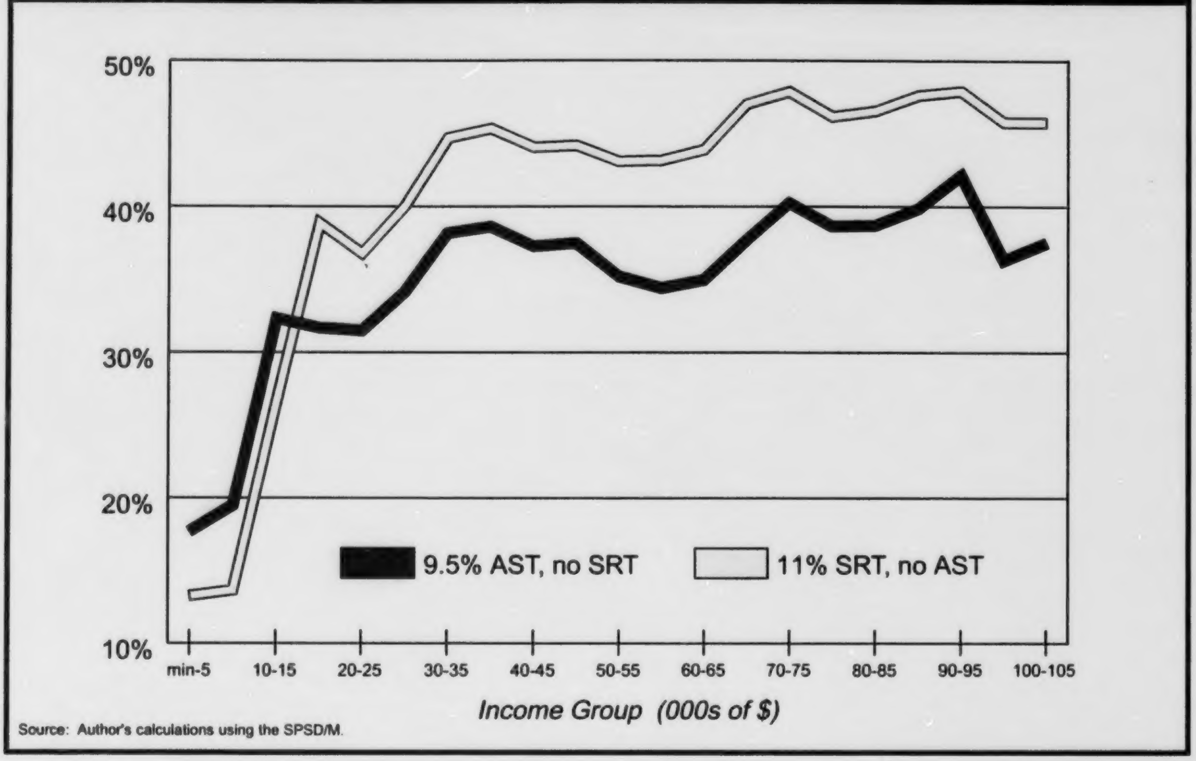
By calculating the MCF associated with a small increase in the SRT rate in Alberta and comparing it to the MCF associated with the introduction of a small AST,[7] it can be determined whether or not such a revenue neutral increase in efficiency can be achieved at the margin by changing the tax mix in Alberta in favour of consumption taxation.

To see how the imposition of a consumption tax like the AST can distort the labour market, and generate the associated efficiency costs, note that in terms of its impact on the labour market an AST is similar to the imposition of a proportional tax on labour income. To see this, consider a representation of an individual's budget constraint typically used in the standard economic model of labour supply that underlies most MCF derivations: $C=wL$, where C is total expenditures on goods and services (consumption), w is the wage rate and L is the amount of labour supplied. This says simply that total expenditures on goods and service (C) must equal total income (wL); savings are ignored and therefore labour income is the only source of income in this simple model. Consider the imposition of a general sales tax on all goods and services at the rate g. The budget constraint then becomes $C(1+g)=wL$, which can be re-written as $C=wL/(1+g)$, or $C=w(1-\tau)L$, where $\tau=g/(1+g)$. Written in this way, τ can be interpreted as the proportional income tax rate on labour income. Thus, it is evident that an indirect consumption tax like the AST levied at the rate g is akin to a proportional tax on labour income at the rate τ – in this respect an AST acts just like a proportional tax on labour income and generates the same sort of distortions and efficiency costs by lowering the relative wage rate.[8]

Of course, an AST would not be introduced into a vacuum, but rather into an already existing income and commodity tax system. Of particular relevance is the fact that the AST would replace only the provincial portion of the personal income tax; the federal tax would remain. In the appendix, it is shown that the introduction of an AST in the presence of a progressive income tax – which Albertans will still face even after the introduction of the SRT because of progressive federal rates, exemption levels and credits, etc. – acts just like an increase in the marginal tax rate in each bracket as follows: $m_i=z_i+\tau(1-z_i)$, where τ is defined as above, z_i is the marginal ***income*** tax rate associated with tax bracket i, and m_i is therefore the ***effective*** marginal tax rate on labour income for tax bracket i, which takes into account both the marginal income tax rate and the sales tax. In the presence of a progressive income tax, the AST thus effectively adds $\tau(1-z_i)$ to each tax bracket. Interestingly, because of the progressive nature of the income tax system, the AST adds less to the marginal tax rate in higher brackets than lower brackets. Thus, substituting an AST for the SRT would tend to flatten out the effective marginal rate structure as it applies to labour income.

This is evident from Figure 4.1, which shows the combined federal/provincial effective ***marginal*** tax rates on labour income (the m_i's) for various income groups of

Figure 4.1
Effective Combined Federal and Provincial Marginal Tax Rates on Labour Income in Alberta, Single Males



Source: Author's calculations using the SPSD/M.

single prime age males (between 20 and 60 years of age) in Alberta under the 11% SRT system and its replacement with a 9.5% AST. The figure shows quite clearly how the replacement of the Alberta income tax with a general sales tax that raises the same revenue would flatten out the effective marginal tax rates on labour income, increasing the effective marginal rates on very low income earners while lowering them for everybody else. Indeed, at income levels over about $30,000 the marginal tax rate on labour income under a 9.5% AST would be roughly constant at just under about 40%.[9]

A key parameter in the determination of the MCF is the elasticity of labour supply. This measures the responsiveness of labour supply to a change in the after-tax wage rate. The more responsive is labour supply (the higher the elasticity) the greater the distortion caused by a tax on labour income, and the higher the efficiency costs caused by the tax. Labour supply elasticities for males are typically quite low, with long-run estimates ranging from 0 to 0.20.[10] Female labour supply elasticities are typically estimated to be much higher, from 0.1 to as high as 1. A base case labour supply elasticity of 0.15 seems reasonable, if not somewhat conservative. This means that a 10% decrease in the after-tax wage rate will lower labour supply by 1.5%. A low estimate of 0.05 and a high estimate of 0.25 will also be used in the calculations. Table 4.1 provides MCF estimates associated with a small increase in the SRT rate and a small increase in the AST starting from the existing tax mix under these elasticity assumptions.[11]

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Table 4.1
Marginal Cost of Public Funds in the Labour Market

Labour Supply Elasticity	0.05	0.15	0.25
Alberta Sales Tax (AST)	1.01	1.08	1.16
Single Rate Tax (SRT)	1.04	1.14	1.25

Starting from the "existing" tax mix, as will exist under the 11% SRT, the cost to the private sector of raising an additional dollar in tax revenue for the base case elasticity assumption is $1.14 for the SRT and $1.08 for the AST. This means that it costs six cents more, in terms of the reduction in net private sector labour income, to raise an incremental dollar from labour using the SRT rather than the AST. Utilizing the conceptual approach outlined above, this suggests that ***at the margin*** economic efficiency in the Alberta labour market could be increased by changing the tax mix by lowering SRT revenue by one dollar and replacing that dollar via the introduction of a small AST – the net increase in labour income in the economy from undertaking such a revenue neutral substitution at the margin would be six cents (a $1.14 increase in private sector labour income by lowering the SRT and a $1.08 decrease in private sector labour income from increasing the AST to make up for the revenue loss, for a net saving of $0.06).

While these calculations are revealing, there is a potential problem with the analysis to this point. As alluded to above, a (small) increase in a ***comprehensive*** consumption tax rate would have to be bigger than a (small) increase in a ***comprehensive*** income tax rate in order to raise the same revenue. Yet, the conceptual exercise engaged in above was to measure the change in efficiency costs associated with replacing a $1 decrease in SRT revenue with a $1 increase in AST revenue, where in each case all of the revenue came from taxing labour income alone. However, because in actuality the income tax base includes not just labour income but also investment income, the small reduction in the SRT that yielded a $1 reduction in tax revenue from the labour market would also reduce tax revenue from investment income. This means that a $1 increase in AST revenue would not be enough to cover the total decline in SRT revenue, and we have not, after all, engaged in a revenue neutral change in the tax mix at the margin.

Short of undertaking a considerably more complicated general equilibrium analysis that simultaneously takes both the labour and capital markets into account, what can be done about this? First, it is important to point out that the above argument holds for ***comprehensive*** income and consumption taxes. Neither the proposed AST nor the existing income tax in Alberta is fully comprehensive, although the former is much more so than the latter. The AST as envisioned would be applied to the GST base, which although it does not apply to all expenditures – the most important omission being grocery food – does include over 85% of total expenditures on goods and services. The income tax, on the other hand, is far from comprehensive, as there are numerous deductions and credits that would not be allowed under a "pure" comprehensive income tax. Most relevant for our purposes are the deductions for Registered Pension Plan (RPP) contributions and Registered Retirement Savings Plan (RRSP) contributions. As discussed above, a direct consumption tax of the registered variety would work very much like the RPP/RRSP system in Canada, with the exception that there would be no contribution limits.

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Table 4.2
Revenue Neutral Adjusted Marginal Cost of Public Funds in the Labour Market

Labour Supply Elasticity	0.05	0.15	0.25
Alberta Sales Tax (AST)	1.04	1.11	1.19
Single Rate Tax (SRT)	1.04	1.14	1.25

In a theme that will be revisited below in the analysis of efficiency costs in the capital market, this suggests that for individuals who do not exhaust the contribution limits on their RRSPs, Canada's (and Alberta's) ***income*** tax is really very close to a ***consumption*** tax. This has two important implications for the analysis of the efficiency implications in the labour market. The first is that it emphasizes that the introduction of a general sales tax in Alberta would not in fact change the consumption/income tax mix for many low and middle income Albertans at all, as they are already subject to a (direct) consumption tax via the income tax. Rather, the introduction of an AST would change the tax mix in favour of consumption taxation primarily for middle and high income Albertans.

The second implication of the treatment of RRSPs is that it weakens the argument that the imposition of an AST will impose a greater distortion in the labour market because of the need to levy a higher tax rate in order to raise the same revenue as the income tax. The ***non-comprehensive*** income base may in fact be quite close to the ***more comprehensive*** consumption base than may have been thought. This suggests the possibility that a consumption tax could actually enhance efficiency in the labour market.

A rough, but reasonable (basically a locally linear approximation), modification to the MCF calculations presented above can be made to take these considerations into account. Calculations using the Statistics Canada SPSD/M model suggests that a small increase in the SRT rate that generates $1 in tax revenue from labour income yields about three cents in tax revenue from the taxation of investment income. This means that a small increase in the AST must generate $1.03 in revenue from the labour market in order to undertake a revenue neutral substitution with the SRT at the margin. The calculations above show that for the base case, an incremental $1 in tax revenue generated from the labour market by the AST results in a total cost to the private sector labour market of $1.08. Thus, generating $1.03 in tax revenue from the labour market via a small increase in the AST – which now fully replaces all of the revenue forgone by lowering the SRT – results in a total cost of about $1.11 (1.03x1.08). This can be thought of as the "revenue neutral adjusted" MCF of the AST in the labour market, which can now be properly compare to the MCF of the SRT (see Table 4.2).

What does this mean? Note that even after this adjustment, the MCF of the AST for the base case elasticity is less than the MCF of the SRT ($1.11 vs. $1.14 for the base case). This suggests that even after correcting for the smaller tax base subject to the AST, the marginal efficiency cost of the AST ***in the labour market*** is still smaller than the marginal efficiency cost of the SRT ***in the labour market***. Of course, and as emphasized above, the SRT also generates distortions, and the accompanying efficiency costs, in the savings/capital market, while the AST does not. This will be explored in the next section dealing with capital market distortions. The key insight here is that starting from the "current" 11% SRT tax system in Alberta,

Table 4.3
Annual Efficiency Costs of Taxes in the Labour Market, % of GDP

	Labour Supply Elasticity			Average Effective Marginal Tax Rate
	0.05	0.15	0.25	
11% SRT	1.7%	2.3%	3.7%	44.1%
9.5% AST	1.1%	1.6%	2.5%	37.0%

Note: Assumes labour's share of total output is two-thirds.

introducing a small AST as a substitution for the SRT would enhance economic efficiency in ***both*** labour and capital markets. Thus, the efficiency implications of changing the Alberta tax mix in favour of consumption taxation via a revenue neutral substitution of the AST for the SRT ***at the margin*** would appear to be unambiguously positive.

It has been established that there is a case in terms of efficiency in the labour market alone for changing the tax mix in Alberta in favour of a consumption tax ***at the margin***. How big would the efficiency gains in the labour market be from introducing an AST that completely eliminated the provincial income tax? Some rough calculations can be made using the standard partial equilibrium approach described in the appendix. The results are contained in Table 4.3. As with the MCF, a key parameter is the labour supply elasticity, so calculations are reported for a base case, a low elasticity case and a high elasticity case.[12] Also shown in the table is the weighted average ***effective*** marginal tax rate for each tax configuration, which reflects both the marginal income tax rates and the adjustment due to the sales tax, as discussed above.

For the base elasticity case (0.15), completely eliminating the 11% SRT and replacing it with a 9.5% AST would lower the efficiency costs of the tax system in the labour market in the long-run by 0.7% of GDP, from 2.3% to 1.6%. While this may not seem like very much, it should be re-emphasized that this is a partial equilibrium calculation for the labour market alone – it does not include efficiency gains from the capital market – and that ***these efficiency savings would be realized each and every year*** once the labour market has fully adjusted to the tax changes and moved to its new steady state. The reduction in the average marginal tax rate from 44.1% to 37.0% associated with the elimination of the SRT and it replacement with a 9.5% AST would, under the base case elasticity scenario, increase labour supply, and therefore total income from employment, in Alberta by about 2%.

To put the magnitude of the efficiency gains in perspective, and using 1998 Alberta GDP and population estimates, in the new steady state the efficiency gain in the labour market from eliminating the 11% SRT and replacing it with a 9.5% AST would, after the behavioural responses were fully realized, be about $600 per household per year under the base case elasticity assumption.

As suggested above, in particular by Figure 4.1 and the discussion preceding it, the efficiency gains in the labour market from replacing the SRT with an AST arise from the fact that the AST is effectively a "more proportional" tax on labour income than is the SRT. Indeed, it serves to offset some of the progressivity of the federal tax in this regard. It is well known that "more proportional" taxes are less distortive and therefore more efficient than

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As suggested above, in particular by Figure 4.1 and the discussion preceding it, the efficiency gains in the labour market from replacing the SRT with an AST arise from the fact that the AST is effectively a "more proportional" tax on labour income than is the SRT. Indeed, it serves to offset some of the progressivity of the federal tax in this regard. It is well known that "more proportional" taxes are less distortive and therefore more efficient than "less proportional" taxes that raise the same revenue; this is simply a reflection of this result.

While the calculations in Table 4.3 admittedly ignore general equilibrium linkages with the capital market, they are nonetheless revealing. The key insight is that there are significant efficiency gains to be had in labour markets alone via the introduction of a general sales tax in Alberta. This tends to go against the conventional wisdom that a consumption tax that raises the same revenue as an income tax would generate ***higher*** efficiency costs in the labour market. As shall be seen in the next section, coupling this with the efficiency gains in the capital market builds a fairly strong efficiency case for the introduction of a consumption tax in Alberta.

The Capital Market

Several considerations arise in the determination of the efficiency costs of taxation in the capital market. One that will be returned to below is that Alberta is a small open economy ***within*** a small open economy (Canada). This suggests at least a partial "disconnect" between the supply side of the capital market – personal savings – and the demand side of the capital market – businesses investment. This "disconnect" has important implications for the impact that personal taxes levied on the income from savings have on business investment.

Another consideration is that the taxation of investment income at the personal level varies according to the source of that income. For example, interest, dividends, and capital gains are all taxed differently under the personal income tax in Canada; this too is an issue that is returned to below.

When individuals make savings decisions they trade-off the value of consumption in the present against the value of consumption in the future. As such, they are motivated, at least in part, by the after-tax ***real*** (inflation adjusted) rate of return on their investments, as this is the rate of return that determines the purchasing power of the income generated from their savings in the future. As such, when determining the impact of taxation on savings decisions, we are interested in the extent to which taxes impinge upon the real rate of return on personal savings. As discussed above, consumption taxes do not impinge upon this real return at all. As shall be seen, income taxes, on the other hand, do impinge upon the return to savings.

As also alluded to above, one of the distinguishing features of the personal ***income*** tax system in Canada is that it has many features that resemble those of a ***consumption*** tax. There are two basic ways in which this is done. The first is to grant a tax deduction for new savings, allowing the investment income to accrue tax free, with the original savings and income earned on that savings fully taxed upon consumption – the registered approach to direct consumption taxation. The second is to effectively exempt investment income from taxation altogether at the personal level, leaving a tax system that taxes only labour income – the pre-paid approach to direct consumption taxation.

Several features of the personal income tax in Canada act to mimic the registered approach to direct consumption taxation. As indicated above, the most important is the treatment of RRSPs and RPPs. Investment income in RRSPs and RPPs is not subject to tax, initial contributions are deductible, and withdrawals fully taxed. Therefore, savings in the form of RRSPs and RPPs are subject to registered direct consumption tax treatment. Of course, there are limits on RRSP contributions – in the simplest cases the lesser of 18% of income or $13,500 – so individuals cannot shelter all of their savings in RRSPs. Other aspects of the tax system mimic pre-paid direct consumption taxation. Important here is the non-taxation of the capital gains on principal residences.

It is thus evident that the return to a lot of investment income earned by individuals in Canada is effectively untaxed and therefore already receives consumption tax treatment. An important question is how much? Poddar and English (1999) calculate that only about one-quarter of personal investment income in Canada is subject to tax; the other three-quarters effectively receives consumption tax treatment. Canada's personal ***income*** tax system would therefore appear to already be three-quarters of the way to a (direct) consumption tax!

The efficiency implications of eliminating the income tax in Alberta, and replacing it with an AST, are examined for the capital market below. The two sides of the capital market – the supply side and the demand side – will be dealt with in turn. Individuals supply financial capital by saving. Thus, the supply side of the capital market concerns the savings decisions of individual Albertans. Firms and businesses require financial capital to purchase productive assets – tangible and intangible capital – that generate output. The demand side of the capital market therefore concerns the investment decisions of Alberta businesses.

The Supply Side: Personal Saving

For the one-quarter of investment income earned by individuals that is subject to taxation in Canada (and Alberta), we can ask in what form is it earned, how is it taxed and what are the resulting efficiency implications for the Alberta economy? To begin answering these questions, Table 4.4, also based on data from Poddar and English (1999), shows the percentage of assessed investment income earned in the form of interest, dividends and capital gains, and the proportion of federal taxes payable arising from each of those sources.

Table 4.4
Income Tax Payable by Type of Investment Income (% of total)

	Proportion of Assessed Investment Income	***Proportion of Federal Tax Payable***
Interest	50%	73%
Taxable Dividends	25%	5%
Taxable Capital Gains	25%	22%

Source: Using data from Poddar and English (1999), Table 3, page 13.

Of assessed investment income at the personal level, one-half is in the form of interest; the other half is split evenly between dividends and capital gains. Although half of assessed investment income is in the form of interest, taxes on interest income account for almost three-quarters of taxes payable on investment income. Dividends, which are 25% of assessed investment income, account for only 5% of taxes payable, while capital gains account for 22%. The disproportionate share of investment income taxes raised from interest reflects the differential treatment of interest, dividends and capital gains for tax purposes.

The impact of taxation on personal savings depends upon its effect on the ***real*** after-tax rate of return at the margin. This means that for efficiency purposes the relevant tax rate is what is referred to as the ***real marginal effective tax rate*** (real METR) on savings, which may differ across types of investments because of their different treatment under the tax system. The real METR on a particular type of investment income is the hypothetical rate of tax that if levied on the real before-tax rate of return on a marginal unit of saving would yield the same

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real after-tax rate of return given by the actual tax system. The real METR on investment income may differ substantially from the ***statutory*** marginal tax rate.

One of the aspects of the taxation of income from investment at the personal level in Canada that is particularly important is that taxes are levied on the ***nominal***, non-inflation adjusted, return to savings, regardless of whether the income is earned in the form of interest, dividends, or capital gains. This means that the tax is applied to the portion of the rate of return required to maintain the purchasing power of the principle. Thus, the income tax effectively applies not just to the income generated by an investment, but to a portion of the principle as well.

Dividends and capital gains also receive special treatment that must be accounted for. In the case of dividends, Canada's gross-up and credit approach to integrating the corporate and personal tax systems is intended (at least partly) to eliminate the double taxation of dividends (once at the corporate level and again at the personal level) by giving taxpayers notional credit for taxes paid at the corporate level on dividends distributed to individuals. Account must be taken of the dividend tax credit in order to measure the real marginal effective tax rate on dividends at the personal level.[13]

Two features of the treatment of capital gains are relevant. The first is that (nominal) capital gains are taxed on realization, when an asset is sold, and not as the gains accrue. This means that capital gains taxes can be deferred indefinitely by holding onto assets that are growing in value over time. Yet recall from section 3 that accrued income is income nonetheless, and indeed is simply a special type of savings as it increases the net wealth of individuals. Account must be taken of this deferral to calculate the real METR on capital gains.

Table 4.5
Nominal and Real Marginal Effective Tax Rates on Investment Income

Interest	***11% SRT***	***9.5% AST***
Nominal METR	41.4%	30.4%
Real METR	58.0%	42.6%
Dividends	***11% SRT***	***9.5% AST***
Nominal METR	26.8%	13.1%
Real METR	37.5%	18.3%
Capital Gains	***11% SRT***	***9.5% AST***
Nominal METR	25.1%	18.1%
Real METR	35.2%	25.3%

Note: Assumes before-tax nominal rate of return of 7%, inflation rate of 2%, and a holding period for capital gains purposes of 10 years. Source: Author's calculations.

Second, when capital gains are realized, only 75% of the gain is included in income. This means that the statutory marginal tax rate facing capital gains is effectively three-quarters of the ordinary statutory rate. The real METR on capital gains also reflects this lower effective statutory rate.

Formulas for the real METRs on interest, dividends and capital gains are derived in the appendix. Table 4.5 presents real METR calculations for investment income earned in various forms for the highest combined federal/provincial marginal income tax rate under the "existing" 11% SRT (41.4%, see Table 2.1) and its replacement with a 9.5% AST (30.4%). As discussed in the appendix, aside from the relevant tax parameters, the calculation of real METRs requires assumptions about the annualized before-tax nominal rate of return on savings, the inflation rate and, in the case of capital gains, the holding period of the capital asset. In the table, in order to compare real METRs on income sources that differ only in their tax treatment, it is assumed that the nominal before-tax rate of return is the real after-tax rate of return given by the actual tax system. The real METR on investment income may differ substantially from the ***statutory*** marginal tax rate.

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Looking first at the nominal METRs under the "current" 11% SRT, the tax rate on interest income (as indicated above, the nominal METR on interest is simply the highest statutory marginal tax rate) is substantially higher than the nominal METRs on dividends or capital gains. This is because of the dividend tax credit and the preferential treatment of capital gains, in particular the deferral effect due to the taxation on realization. Under the assumptions underlying the calculations, the nominal METR on capital gains is lower than the nominal METR on dividends under the 11% SRT and higher in the 9.5% AST case. However, this is sensitive to the assumption regarding the holding period of the capital asset. For example, the holding period in the table is assumed to be ten years. If this is reduced to five years, the nominal METRs on capital gains increase by about four percentage points.

Turning to the real METRs, it is evident that the taxation of nominal returns increases the effective rate of tax on investments substantially above their nominal METRs. Even with fairly low inflation rates (assumed to be 2% in the calculations), the real METRs in each case are from four to eleven percentage points higher than their nominal counterparts, depending upon the source of income and the tax regime, because of the implicit taxation of the investment principle due to the taxation of nominal returns. While the real METR on interest is substantially higher than the statutory maximum marginal tax rate, the real METRs on dividends and capital gains remain below it because of the dividend tax credit, the 75% capital gains inclusion rate, and the deferral effect for capital gains. Thus, with the very important exception of interest, investment income is treated preferentially at the personal level relative to labour income.

Comparing the nominal and real METRs between the two tax regimes, it is clear that the introduction of an AST to replace the Alberta income tax would substantially lower the METR on all forms of investment income. The elimination of the Alberta portion of the income tax lowers the real METR by 15.4 percentage points for interest, 19.2 percentage points for dividends, and 9.9 percentage points for capital gains. What are the efficiency implications of reducing effective tax rates on savings by these magnitudes? Two important issues must be addressed before this question can be answered.

The first issue, one that will be returned to in detail in the next section on investment, is that in a small open economy like Alberta, when financial capital is mobile, there is a "disconnect" between the supply (savings) and demand (business investment) sides of the capital market. Indeed, if financial capital is ***perfectly*** mobile in the long-run, the disconnect is complete and there is technically no connection between the two sides of the market from a domestic perspective.

What is meant by "disconnect?" Consider the limiting case of perfect capital mobility. This means that Albertans may invest their savings in stocks, bonds, etc. anywhere in the world. It also means that Alberta businesses can access financial capital from anywhere in the world. On the supply (savings) side of the capital market this means that the before-tax rate of return earned by savers in Alberta is fixed from their perspective, determined by the international financial market of which Alberta savings account for only a small proportion. On the demand (business investment) side of the market, it means that the before corporate tax rate of return that businesses must pay investors in order to attract their savings is also determined by the international financial market. This implies that, unlike an economy with immobile capital, the savings of Albertans do not necessarily end up being invested in Alberta companies, and even when they are, an increase or decrease in the supply of those savings has no impact on the after corporate tax rate of return that businesses must provide to their investors. Rather, decreases or increases in Alberta savings show up simply as a change in the proportion of domestic business investment financed by Albertans, the remainder being financed by "foreign" (non-Albertans) savings. As such, while taxes imposed on the return to savings at the personal level may affect the supply of savings by Albertans, and generate the usual type of efficiency costs associated with all distortionary taxes, when capital is perfectly mobile there is no impact on business investment in Alberta, and the efficiency costs are confined to the supply side of the capital market. Similarly, changes in the taxation of business investment in Alberta will affect capital investment in the province, and generate the associated distortions, but these effects will be confined to the demand side of the capital market and will have no impact on the saving decisions of Albertans. It is in this sense that the two sides of the capital market are "disconnected" when capital is mobile.

Strictly speaking, the concept of ***perfect*** capital mobility is a theoretical fiction – and the consequences of relaxing it will be explored in the next section – but it is an extremely convenient fiction and is probably a reasonable first approximation. It also has stark implications for analyzing the implications of changing the taxation of the return to savings at the personal level. The resulting disconnect between the two sides of the capital market means that any change in personal income taxes in Alberta will have no impact on business investment in the province, and therefore no change in the province's capital stock. This is the inevitable consequence of perfectly mobile capital. It decidedly does ***not*** mean that taxing savings has no impact on savings decisions, which generates efficiency costs for Albertans, but rather that those distortions and the associated efficiency costs are confined to the supply side of the capital market.

The second issue that must be considered before the efficiency of introducing an AST for the capital market can be assessed concerns the implications of the estimate by Poddar and English (1999) that three-quarters of investment income in Canada is effectively untaxed, and therefore subject to (direct) consumption tax treatment. If the personal ***income*** tax system in Canada, and by extension Alberta, is already three-quarters of the way towards a consumption tax, clearly moving the rest of the way is likely to generate rather small efficiency savings in capital markets!

It turns out that this inference may not in fact be correct. Economists are well known for their obsessiveness over the distinction between the notions of average and marginal; in this case the distinction is quite important. The 75% figure quoted above is an average – out of all investment income earned in Canada, 75% is effectively tax free. In other words, on average, 75 cents out of every dollar of investment income is not subject to taxation. Yet efficiency costs and distortions should be

Table 4.6

Annual Efficiency Costs of Taxes on the Supply Side of the Capital Market, % of GDP

	Savings Supply Elasticity			**Average Effective Marginal Tax Rate**
	0.2	**0.3**	**0.5**	
11% SRT	0.33%	0.58%	0.83%	47.2%
9.5% AST	0.16%	0.27%	0.39%	32.2%

Note: Assumes a nominal before-tax rate of return of 7%, and inflation rate of 2%, and a stock of savings to output ratio of 3.

measured at the margin. To determine the efficiency effects of a reduction in the income tax rate due to the introduction of an AST, the effective rate of tax on the rate of return generated by an additional, or marginal, unit of saving must be determined.

Poddar and English (1999) report that over half of taxable dividend and two-thirds of taxable capital gains are earned by individuals with assessed incomes in excess of $100,000; the vast bulk of investment income is earned by individuals with income in excess of $50,000. Yet these are also the individuals who are most likely to have exhausted many of the "easy" ways of tax sheltering investment income. While it is possible that for some of these individuals an additional dollar of income from savings will escape taxation altogether, it is more likely that an incremental dollar will attract tax in some form because of the exhaustion of RRSP/RPP limits. Thus, even though the average effective tax rate on capital may be very low, even close to zero, the marginal effective tax rate could be quite high. It is the latter that determines the efficiency costs. Indeed, the very fact that ***any*** investment income in Canada attracts tax at the personal level at all, let alone 25% of it, suggests that many of the individuals who are saving in Canada have in fact exhausted their ability to shelter this income, and that the most reasonable approximations of the real ***marginal*** effective tax rates on capital income at the personal level at the margin are those given in Table 4.5. That is what is assumed here.

Recent empirical support for this approach comes indirectly from a paper by Veall (1999). Veall investigates whether the substantial flattening of the Canadian personal tax structure in the 1988 tax reform had any effect on RRSP contributions. He found "no convincing evidence that these changes affect RRSP contributions" (11). It is important to emphasize that he did not examine the impact of the tax changes on overall savings, but only savings in the form of RRSPs. Veall's empirical results indicate that any increase in savings in Canada in response to reduced taxes tends to take place in non-RRSP vehicles at the margin, and not through RRSP contributions.

The technical appendix develops these ideas in a slightly more formal fashion and presents the approach for calculating the efficiency cost of personal taxes on the return to savings in Alberta. As with the labour market, the approach is a partial equilibrium one. Since there is no question that changing the tax mix in favour of consumption taxation will generate efficiency gains in the capital market – the only question is how large they are – we bypass an examination of the MCF and move directly to the full efficiency calculations.

Table 4.6 presents estimates of the efficiency cost of taxing savings under the 11% SRT and its replacement with a 9.5% AST. As with Table 4.3 in the previous section, the calculations are expressed as a percentage of provincial GDP. A key parameter in the efficiency cost

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Table 4.6 presents estimates of the efficiency cost of taxing savings under the 11% SRT and its replacement with a 9.5% AST. As with Table 4.3 in the previous section, the calculations are expressed as a percentage of provincial GDP. A key parameter in the efficiency cost calculation is the elasticity of savings with respect to the after-tax interest rate. There is some controversy surrounding the elasticity of saving. Some studies suggest it may be in the order of 0.4 to 0.5 in the long-run – e.g., a 10% increase in the real after-tax rate of return to saving will increase saving by 4%-5%; others suggest it is in the order of 0.1 to 0.2 (see Bernake 1999). As above, efficiency cost estimates are presented for various elasticity assumptions – a low long-run elasticity scenario of 0.2, a high elasticity scenario of 0.5, and a base case of 0.3. The real METR used in the efficiency cost calculation is a weighted average of those given in Table 4.5, using the weights on sources of assessed investment income from Table 4.4.

For the base elasticity case (0.3), completely eliminating the 11% SRT and replacing it with a 9.5% AST would lower the efficiency costs of the tax system in the savings market by 0.31% of GDP in the new steady state, from 0.58% to 0.27%. As with the estimates for the labour market, this may not seem like very much, but provincial GDP is a large number and, once the adjustments in the savings market in response to the tax changes are complete, ***these efficiency savings would be realized each and every year***. To put the magnitudes in perspective, and using 1998 Alberta GDP and population estimates, the efficiency gain in the savings market from moving from the 11% SRT to the 9.5% AST would be about $250 per household per year.

As in the labour market, there are significant efficiency gains from replacing the province's share of the income tax with an indirect consumption tax. ***Taken together, the efficiency gains in the labour market and the savings side of the capital market are in the order of 1.0% of GDP in the long-run, which amounts to about $850 per family per year.***

The Demand Side: Business Capital

As indicated in the previous section, if the capital market is small and open with perfectly mobile capital, changes in personal taxes on the savings side of the market will have no impact on the size of the capital stock in the province. As also indicated, the concept of perfect capital mobility is a theoretical fiction, even in the long-run. This is most certainly true for equity capital, though probably less so for debt capital. In this section, the implications of relaxing the assumption of perfect capital mobility in the equity market will be examined. Specifically, it will be assumed that while investors may purchase bond instruments that are traded internationally, equity investments in domestic companies are not traded internationally and are held only by domestic (Alberta) investors. Thus, while the bond market is "open," the equity market is "closed." This, of course, is also a theoretical fiction as large Albertan corporations are clearly able to access international equity markets, but by examining this opposite extreme we can develop a feel for how the introduction of an AST in Alberta, and the associated reduction in the effective tax rates on saving, may feed through to business investment.

Neoclassical investment theory suggests that changes in the taxation of savings at the personal level can, under some circumstances, affect real investment by businesses by altering the ***user cost of capital***. As is well known (for example, see McKenzie, Mansour and Brûlé 1998, and the references there-in) the user cost of capital for a very simple representation of the corporate tax system can be shown to be:

$$C = (r_f + \delta - \pi)\left[\frac{1 - uZ}{1 - u}\right]$$

where r_f is the opportunity cost of finance facing the firm (to be explained below), δ is the economic rate of depreciation on the firm's physical capital, π is the inflation rate, u is the statutory corporate income tax rate and Z is the present value of the tax depreciation allowances on a one dollar capital expenditure.

In the case where debt is presumed to be traded on international markets while equity is only held locally, the link between the taxation of personal savings and physical investment by businesses is provided by the real opportunity cost of finance, r_f. Unfortunately, economists have not developed a generally accepted theory of corporate and personal finance that can be used to confidently evaluate the impact of personal taxes on r_f. However, if certain assumptions are imposed, some insights can be obtained. In particular, invoking bankruptcy or agency cost arguments, it can be shown that the opportunity cost of finance facing the firm is a weighted average of the cost of debt and equity:

$$r_f = i\mu\,(1 - u) + \rho\,(1 - \mu)$$

where i is the nominal interest rate on debt, μ is the debt/asset ratio, and ρ is the opportunity cost of equity finance (discussed in more detail below). This equation reflects the fact that the cost of debt finance (interest) is deductible for tax purposes at the corporate level while the cost of equity finance is not.

A key question involves the cost of equity finance in this expression, ρ. It is the before personal tax rate of return expected, or required, by shareholders on their investment. Under the widely held "traditional" view of dividend and equity taxation, firms minimize the opportunity cost of equity finance by adopting an interior financial policy relying at the margin on both sources of equity finance – retained earnings and new share issues. Under these conditions, the opportunity cost of equity finance facing the firm can be shown to be equal to the following weighted average:[15]

$$\rho = \frac{\rho^n}{1 - m_e}$$

where ρ^n is the after-tax required by equity holders, and m_e is the effective tax rate on equity at the personal level, which is equal to $m_e = m_d\gamma + m_c(1 - \gamma)$, where m_d is the (nominal) marginal effective tax rate on dividends, m_c is the (nominal) marginal effective tax rate on capital gains, and γ is the dividend payout ratio. Thus, the marginal tax rate on equity is a weighted average of the nominal marginal effective tax rates on dividends and capital gains.

This equation suggests the potential for the personal income tax to affect the user cost of capital for the firm through its impact on the opportunity cost of equity finance. A key issue in this regard is the identity of the marginal shareholder, which in turn will determine the relevant marginal tax rates to use in the determination of the opportunity cost of equity finance. In the case where equity capital is perfectly mobile, the marginal shareholder is effectively presumed to be a foreigner, and changes in domestic taxes on equity will have no impact on the opportunity cost of equity finance to the firm, and therefore no impact on the user cost of capital and investment. In the case where debt is traded internationally while equity is not, the marginal shareholder is a domestic resident, and the relevant marginal tax rates are the domestic rates.

The next step is to determine the nature of the capital market equilibrium, which determines the relationship between ρ and i. With debt traded internationally, the debt interest rate (i) will be fixed. The key is then the equilibrium determination of the opportunity cost of equity. In the technical appendix, a modification of a model by Apel and Sodersten (1999) is used to develop the appropriate capital market arbitrage condition, which is a tax adjusted version of the well known capital asset pricing model (CAPM):

$$\rho = i \frac{1 - m_i}{1 - m_e} + [r_m - i \frac{1 - m_i}{1 - m_e}]\beta$$

where r_m is the expected rate of return on the market portfolio, and $\beta = COV(r_m, \rho)/VAR(r_m)$ is the firm's CAPM "beta." "Beta" is a measure of the degree of systematic, or non-diversifiable, risk associated with an equity investment. If $\beta > 1$ the equity investment is "more risky" than the market as a whole, while if $\beta < 1$ the equity investment is "less risky" than the market.

This capital market equilibrium condition indicates that the before-tax expected rate of return on an equity investment in a firm is equal to the tax-adjusted "normal" risk-free rate of return on debt, which reflects the possibility that the returns to debt and equity may be taxed differentially under the tax system (i.e., that m_i may differ from m_e), plus a risk adjustment that is equal to the "excess" rate of return on the market portfolio over the tax adjusted interest rate times a measure of systematic market risk captured by the firm's beta. The capital market equilibrium equation stresses that even though the equity capital market may be "closed," domestic shareholders may still invest in the international bond market and earn a risk-free rate of return of i that is taxed at the rate m_i. The interest rate i is fixed by international financial markets and is therefore not affected by changes in domestic tax rates.

Changes in m_i and m_e affect the before-tax required rate of return on equity that enters the opportunity cost of finance expression, which in turn affects the user cost of capital and therefore investment.

Examination of the equation for the opportunity cost of finance emphasizes two points that will prove to be important in the determination of the impact of the replacement of the SRT with an AST on business investment. First, note that what is relevant for the opportunity cost of equity finance is the ***relative*** impact of the tax change on the marginal tax rate on interest (m_i) and the marginal tax rate on equity (m_e), remembering that the latter is a weighted average of the effective tax rate on dividends and capital gains. The elimination of the SRT lowers the ***statutory*** tax rate, which has differential impacts on the ***effective*** tax rates on interest and equity due to their differential treatment under the income tax (see the discussion in the previous section and the technical appendix).

Second, note that there are two offsetting effects associated with an increase in, say, m_e relative to m_i (which will increase $(1-m_i)/(1-m_e)$). The first effect is captured by the first term on the right hand side of the equation, and says simply that an increase in the tax rate on equity relative to the tax rate on interest will raise the "normal" before personal tax required rate of return, and therefore ***increase*** the opportunity cost of finance. The second effect, captured by the second term on the right hand side, says that this will also lower the risk premium required on equity, which would tend to ***decrease*** the opportunity cost of finance. Which effect dominates depends upon whether β is greater or less than 1. For "more risky" firms, with a $\beta > 1$, the latter effect will dominate and an increase in m_e relative to m_i will actually reduce the opportunity cost of finance to the firm, encouraging investment. For "less risky" firms, with a $\beta < 1$, the first effect will dominate, increasing the opportunity cost of finance and discouraging investment.

To evaluate the empirical magnitude of the potential

Table 4.7
User Cost of Capital

	β=.8	***β=1.1***	***β=1.5***
11% SRT	0.1968	0.2152	0.2401
9.5% AST	.1974 (.30%)	.2148 (.18%)	.2384 (.71%)

Assumes: $i=.07$, $\delta=.10$, $\mu=.40$, $\gamma=.20$, $\pi=.02$, $u=.45$. The tax depreciation rate used in the calculation of the present value of the depreciation allowances was assumed to be 20% on a declining balance. Percentage changes from the 11% SRT case are shown in brackets.

changes in the capital stock, we can make "reasonable" assumptions about the parameters that enter the effective tax rate, opportunity cost of finance, and user cost of capital equations, and evaluate the impact of eliminating the SRT on business investment in the case where debt is traded internationally while equity is not. This is done in Table 4.7, which presents user cost of capital estimates under "reasonable" parameter assumptions for the two tax mix scenarios.

First note that the elimination of the 11% SRT increases the user cost of capital slightly for the "less risky" scenario ($\beta=.8<1$). On the other hand, the elimination of the SRT decreases the user cost of capital for the two "more risky" ($\beta>1$) scenarios slightly. This is because while the reduction in the statutory income tax rate that would accompany the introduction of the AST lowers the effective tax rate on both interest and equity income, the effective tax rate on the former falls relatively more than the effective tax rate on the latter, thus the tax rate on equity ***relative to*** debt actually increases. For "less risky" companies, where the impact on the "normal" rate of return dominates the impact on the risk premium, this leads to a slight increase in the user cost of capital, and associated decline in investment. For "more risky" companies, where the impact on the risk premium dominates the impact on the "normal" rate of return, this would lead to a decrease in the user cost of capital and an increase in investment.

So much for the ***direction*** of the change in the capital stock; what about the ***magnitude***? Two points are relevant here. The first is that the relative decline in the tax rate on interest with respect to equity due to the reduction in the income tax rate is quite small. This in and of itself suggests fairly modest changes in investment.

The second point concerns the sensitivity of the capital stock to changes in the user cost of capital. The percentage change in the user cost of capital from the 11% SRT base case is shown in brackets for the 9.5% AST scenario. There is some controversy regarding the long-run elasticity of the capital stock with respect to the user cost of capital. Although a fairly well developed consensus has emerged suggesting that cost of capital effects are statistically significant, some studies suggest fairly low elasticities, others fairly high elasticities. A recent paper by Chirinko, Fazzari and Meyer (1999) using a large US micro data set suggests that the best estimate of the user cost elasticity of the capital stock is about -0.25.

Using this elasticity estimate and the greatest percentage change in the user cost of capital from Table 4.7 (a .71% decrease in the cost of capital in the full SRT replacement case for the riskiest companies), suggests a long-run increase in the capital stock of only about 0.18%. When one couples the fact that this is the most optimistic outcome with the fact that investment increases will be much lower for "less risky" firms, and will even fall in some cases, and with the presumption underlying the calculations that ***all*** equity capital is held by domestic residents, it appears safe to conclude that the impact of replacing the SRT with a consumption tax on business investment in Alberta would likely be very small.[16]

The conclusion that tax changes on the savings side of the capital market have a small impact on capital formation is consistent with other analyses. For example, Chirinko, Fazzari and Meyer (1999) present some policy simulations based upon their econometric estimates of the user cost elasticity in the US. They look at the impact on capital formation of a large reduction in the tax rate on capital gains at the personal level vs. a reduction in the corporate tax rate and the introduction of an investment tax credit at the corporate level. The reduction in the taxation of savings at the personal level, via the reduced capital gains rate, has a very small impact on business investment in their policy simulations relative to the corporate tax initiatives, even in a closed economy context.

4.3 Equity Implications

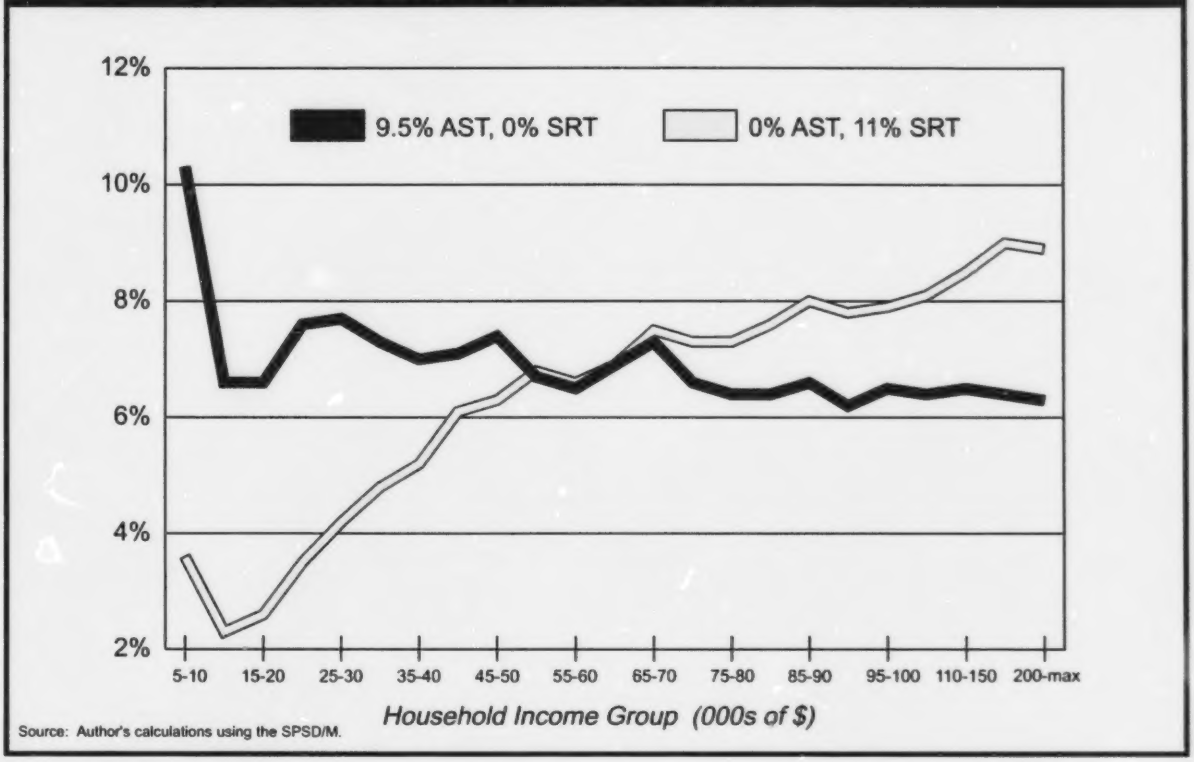
It has been established that non-trivial efficiency gains are likely to be realized in both labour and capital markets from eliminating the personal income tax in Alberta and replacing it with a consumption tax like the AST. What of the distributional, or equity, implications of this change in the tax mix? This section is devoted to an analysis of this important issue. As discussed in section 3, although equity is a difficult issue to address, as one person's evaluation of the fairness of the tax system may differ markedly from another person's evaluation, economists typically invoke two concepts to sharpen the analysis of fairness and equity. They are the notions of horizontal and vertical equity. Horizontal equity concerns the treatment of individuals in similar economic circumstances by the tax system, and suggests that a tax system should treat "likes alike," while vertical equity concerns the treatment of individuals in different economic circumstances.

Although some economists argue in favour of a consumption tax base on the basis of the resulting efficiency gains, for many policy analysts one of the most compelling arguments in favour of consumption taxation is actually a horizontal equity one. These arguments were presented in section 3 and need not be reiterated in-depth here. The key insight was that by taxing the return to saving, income taxes discriminate against individuals with a preference for saving, giving rise to intertemporal horizontal inequities. Although introducing an AST in Alberta as a replacement for the income tax would not generate complete horizontal equity from an intertemporal perspective – after all, a federal income tax that discriminates against savings would still exist, and, as discussed, even that income tax already resembles a direct consumption tax to a substantial degree – it would go some way in that regard by lowering the effective tax rate on the remaining capital income that is subject to taxation at the personal level in Alberta, and would thus treat "likes *more* alike" than does the existing income tax.

The focus in this section is instead on vertical equity. Vertical equity considerations are, typically, the most contentious aspect of any tax reform. Vertical equity has to do with the distribution of the tax burden among individuals in different economic circumstances. It typically manifests itself in the idea that people in favourable economic circumstances, and therefore with a greater ability to pay, should bear more of the tax burden than people in less favourable circumstances. Note that vertical equity says nothing about how much higher the tax burden on higher income individuals should be.

As discussed in section 3, discussions of vertical equity often focus on the degree of progressivity, or lack thereof, in the tax system as manifested in the configuration of average tax rates over the various income ranges. While most economists are of the view that there are good reasons to use present value lifetime measures for

Figure 4.2
Average Tax Rates: 9.5% AST, 11% SRT



Source: Author's calculations using the SPSD/M.

both taxes and income in the calculation of average tax rates, such a calculation was not possible for this study, so an annual measure was used instead.

Figure 4.2 illustrates average tax rates for Alberta by household income group on an annual basis under the "current" 11% SRT and under a 9.5% AST that would fully replace it. The average tax rates were calculated using simulations from the SPSD/M model. Taxes in the calculation include provincial commodity/sales taxes, personal income taxes, property taxes, and health levies. Income is total ***household*** income, which includes market income (labour income plus investment income) plus government transfers (seniors' benefits, child tax credit, GST credit, Employment Insurance, Social Security, Canada Pension Plan, etc.).[17]

Looking first at the "current" system, the average tax rates under the 11% SRT display a rising profile throughout most of the income ranges, preceded by a small decreasing range for the lowest income households. Thus, over all, the "current" tax system in Alberta is modestly progressive, ranging from a low average tax rate of just over 2% to a high of about 9%. This is because of the linear progressive nature of the SRT – a large exemption coupled with a flat tax rate thereafter.

It is clear from the figure that the replacement of the 11% SRT with a 9.5% AST would change the distributional burden of the Alberta tax system substantially. For all households with incomes in excess of $10,000 the average tax rate would vary over a small range between 6.6% and 7.7%. Thus, for most households the Alberta tax system under a 9.5% AST that replaced the 11% SRT would be essentially proportional, with an average tax rate of around 7%. This, of course, would mean an increase in the average tax rate paid by lower income households and a decrease paid by higher income households relative to the "current" system. The crossover point is at a household income level of about $45,000 – households with income less than this would face higher Alberta taxes under the 9.5% AST than under the 11% SRT and households with income higher than this would face lower Alberta taxes.

Figure 4.2 shows that replacing the 11% SRT with a 9.5% AST would tilt, or flatten out, the distribution of the tax burden in Alberta, turning a modestly progressive tax system into an effectively proportional system. Whether this is a more or less vertically equitable distribution of the tax burden than the "existing" system is obviously a matter open to personal judgement. Two points are worth noting, however. The first, perhaps rather trite, point is that even under a proportional provincial tax system high income households pay substantially more in taxes in absolute dollar terms than do low income households – 7% of a high income is more than 7% of a low income. Thus, under a proportional system the ***absolute*** burden of taxes would still increase with income.

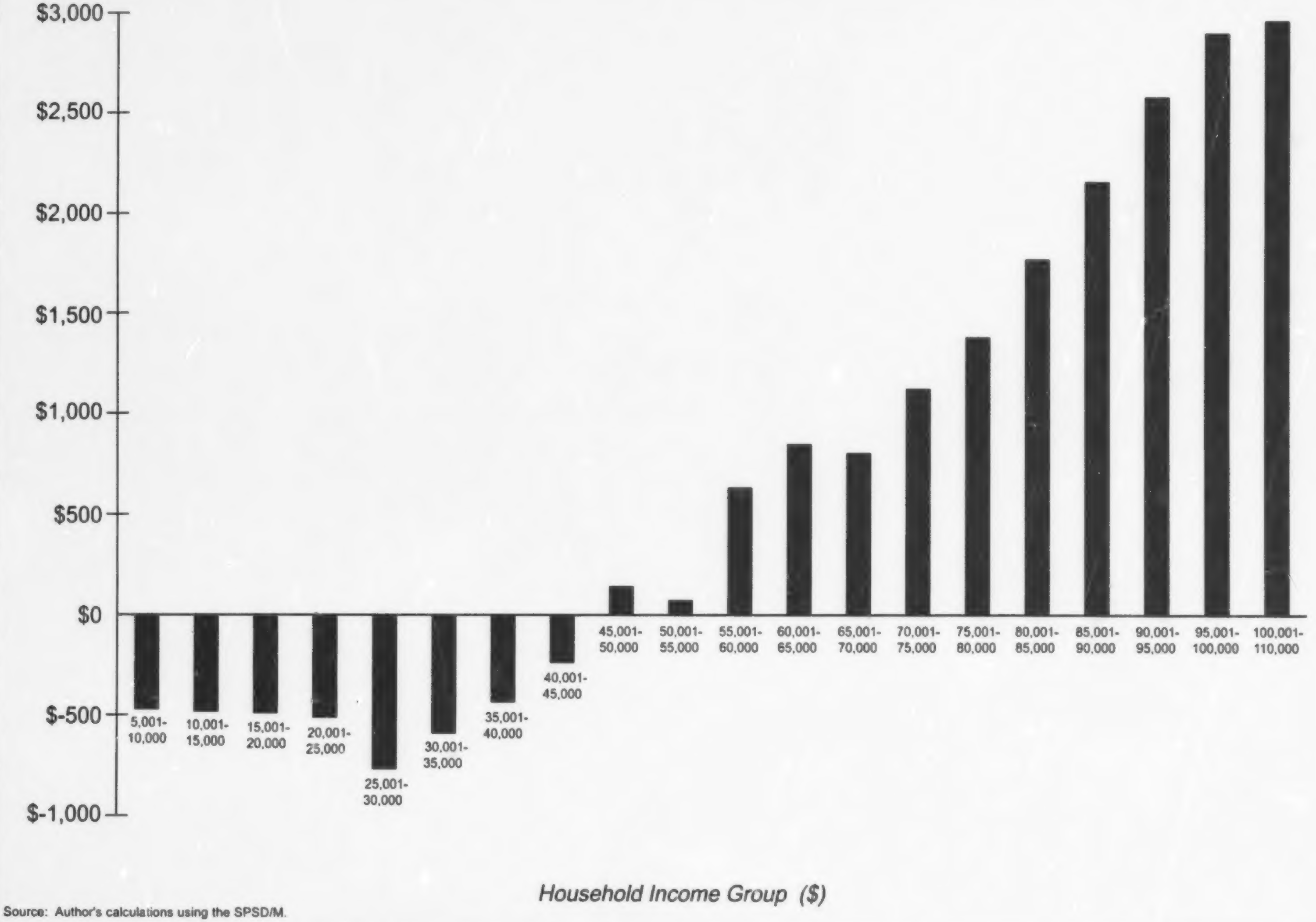
The second point is that, as emphasized above, the average tax rates in Figure 4.2 are calculated on an annual basis. When comparing average tax rates calculated on a lifetime basis to average tax rates calculated on an annual basis, lifetime calculations display a less regressive configuration of tax burdens than the annual calculations (see Davies 1992). Because of this, the AST would look more progressive (less regressive) relative to the "current" system than suggested by Figure 4.2 if the computations were conducted on a lifetime basis.

The impact of a change in the tax mix in favour of consumption taxes on low income households, as manifested in the increase in average tax rates for these groups vis-à-vis the 11% SRT case, may be a matter of some concern. What does the rise in average tax rates mean on a dollar basis per household? Figure 4.3 shows the change in ***consumable income per household*** by income group from replacing the "existing" 11% SRT with a 9.5% AST. Consumable income is defined as market income plus government transfers, less provincial income and commodity/sales taxes. It thus measures the total income available for consumption after the payment of all taxes (including income and sales taxes). A positive change in consumable income means that a household would have more money available for consumption (after the payment of all taxes) after the replacement of the income tax with a 9.5% AST; a negative change means that they have less. The calculations take behavioural changes in labour supply and savings resulting from the tax changes into account.[18]

These behavioural changes, which were reflected in the efficiency calculations in section 4.2, generate an average overall increase of about $800 in consumable income per household due to the replacing the SRT with a 9.5% AST. Thus, as suggested by the efficiency analysis, ***total*** consumable income would increase under an AST in Alberta; the concern here is with the ***distribution*** of that increase among household income groups.[19]

Despite the overall increase in consumable income per household predicted by the replacement of the SRT with

Figure 4.3
Change in Consumable Income per Household: 9.5% AST vs. 11% SRT



Source: Author's calculations using the SPSD/M.

an AST, Figure 4.3 shows that the change in consumable income would vary substantially across household income groups. Households with income less than $45,000 would experience a decrease in consumable income, while households with incomes greater than $45,000 would experience an increase. The hardest hit income group would be households with incomes between $25,000 and $30,000, who, the simulations suggest, would experience a $770 per household reduction in consumable income due to the replacement of the SRT with a 9.5% AST. Higher income households, on the other hand, would experience a rather substantial increase in consumable income, as high as almost $3,000 per household for those with household incomes in the $100,000 range. These are clearly very large differences that must be addressed.

Another way of looking at the change in the distribution of consumable income in Alberta due to the replacement of the SRT with an AST is to look at the number of "winners" and "losers" from the tax reform. This is done in Figure 4.4, which shows for each ***household*** income group the number of ***individuals*** whose consumable income would either increase or not change under the 9.5% AST vs. the 11% SRT ("winners or indifferent"), and the number of ***individuals*** whose consumable income would decrease ("losers"). The SPSD/M model simulations were performed on an extrapolated sample size of 2.788 million individuals (1.244 million families).

Not shown in the figure, because it distorts the scale, is the ***total*** number of "winning or indifferent" and "loser" individuals under the AST vis-à-vis the 11% SRT. In the simulations, 1.570 million individuals in total would experience either an increase or no change in their consumable income under the 9.5% AST with respect to the 11% SRT, while 1.219 million individuals would experience a decrease in their consumable income. Figure 4.4 shows that although there are "winners and losers" in all household income categories from fully replacing the 11% SRT with a 9.5% AST, the number of "winners or indifferent" individuals in a particular income group do not out number the "losers" until household income exceeds $35,000. For all household groups with income in excess of this $35,000, the number of "winners or indifferent" individuals exceeds the number of "losers." "Winners" and "losers" appear in all household income categories because of differences in household make-up (i.e., number and age of household members), differences in spending patterns and savings rates, and differences in the source of taxable income.

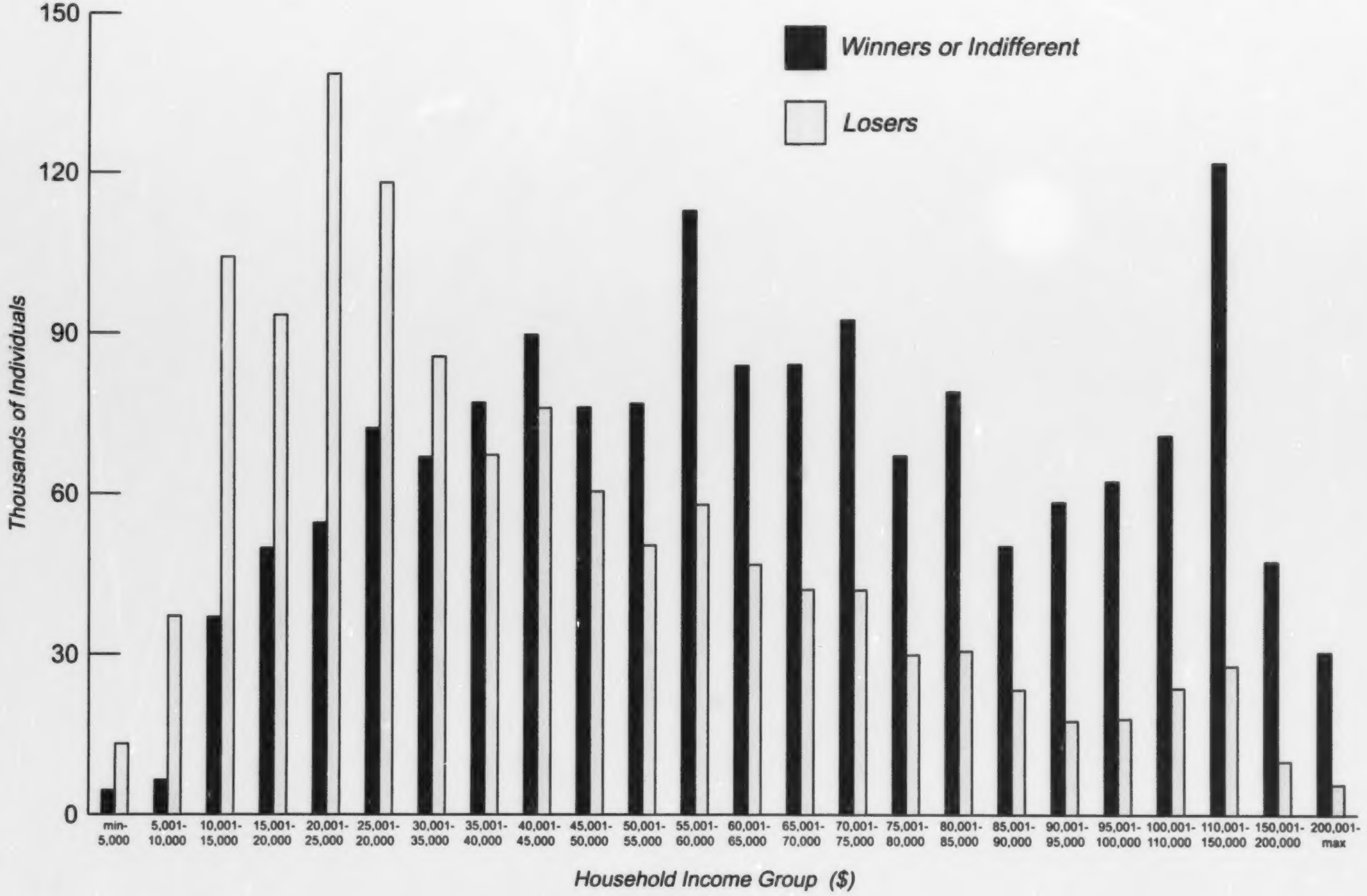
Table 4.8

Aggregate Changes in Consumable Income from Replacing the SRT with a 9.5% AST

Aggregate Increase for "Winners"	***Aggregate Decrease for "Losers"***	***Aggregate Increase for All Households***
$1,160,000,000	$270,000,000	$890,000,000

Table 4.8 shows the ***aggregate*** (not per household) change in consumable income that the simulations suggest would occur with the replacement of the 11% SRT with a 9.5% AST. As is evident from the table, in terms of consumable income, the ***aggregate*** gains of the "winners" is greater than the ***aggregate*** losses of the "losers" by $890 million. This would suggest that the "winners" could compensate the "losers" and still be better off in terms of consumable income. This is reflective of the behavioural changes and efficiency gains that the simulations suggest would arise because of the change in the tax mix. Specifically, in terms of Table 4.8, a ***lump sum*** (non-distortionary) transfer of $270 million from the "winners" to the "losers" could, conceivably, make everyone better off and no one worse off in terms of consumable income from the change in the tax mix.

Figure 4.4
Winners and Losers, 9.5% AST vs. 11% SRT



Source: Author's calculations using the SPSD/M.

This is an extremely important insight, as it suggests scope for changes in the tax mix that could enhance, or at least not detract from, both the equity and efficiency of the tax system in Alberta.

The problem is that it is difficult, if not impossible, to know exactly who the winners and losers are, and to compensate the losers with lump-sum transfers (that is, transfers that do not depend upon the actions or behaviour of the individual). Feasible mechanisms that transfer income from higher to lower income households will inevitably distort behaviour, which would detract, at least to some extent, from any efficiency gains associated with the change in the tax mix in the first place. The age-old equity-efficiency trade-off is difficult to escape in any realistic policy environment. A key question for the purposes of this study is the following: is it possible to implement a mechanism that would alleviate some of the potentially negative distributional implications of replacing the SRT with an AST without completely dissipating the efficiency gains? This question is addressed in the next section, where several alternatives are considered.

5. Modifications and Alternative Scenarios

The perspective of the study up to this point has been one of completely eliminating the personal income tax in Alberta and replacing it with a sales tax that would raise the same revenue as projected under the 11% SRT. The analysis suggests that while the revenue neutral replacement of the province's share of the income tax in Alberta with an AST would generate sizable efficiency gains, it would also give rise to distributional concerns without the introduction of a transfer program to lower income households.

As shown at the end of the previous section, the fact that there is a positive net gain in consumable income from replacing the income tax with a sales tax suggests that some of this gain could be transferred from higher income households to lower income households via some sort of transfer mechanism. One way of doing this would be to implement a ***refundable sales tax credit*** (STC) at the provincial level, modeled in a similar way to the federal government's GST credit. Although other transfer mechanisms are possible, a refundable STC at the provincial level has the merit of being a familiar program which could be administered in conjunction with the federal STC. The federal sales tax credit provides a refundable credit of $199 per adult and $105 per child. The credit is reduced, or "clawed back" at the rate of 5% for household income in excess of a "threshold" level of $25,921. There is also a supplemental credit of $105 for single individuals and lone parents. The credit is refundable in the sense that an individual will receive the credit even if they have no taxable income. The important question for our purposes is whether the implementation of such a program at the provincial level would dissipate the efficiency gains from changing the tax mix.

The purpose of this section is thus two-fold. First, the perspective of the study will change from one where the AST would ***completely*** replace the SRT to one where the AST would ***partially*** replace the SRT, maintaining revenue neutrality. It will be shown in this context that it is possible to design an AST/SRT/STC mix that addresses the vertical equity concerns of completely replacing the income tax with a sales tax without completely eliminating the efficiency gains. Second, up to this point the AST/SRT/STC combinations considered would collect roughly the same revenue as a SRT imposed at an 11% rate. As indicated above, the 11% SRT is projected to deliver a tax cut of about $600 million upon implementation (about 3.5% of total revenues). Some analysts have suggested that there is scope for even greater tax cuts in Alberta without reducing real per capita expenditures. This suggests that an AST rate of less than 9.5%, if coupled with a tax cut, could completely replace the provncial personal income tax. The second purpose of this section is to analyze the efficiency and equity implications of introducing a sales tax in Alberta to replace the SRT in conjunction with an additional tax cut.

The objective of this section is not so much to present a "menu" of alternative AST/SRT/STC tax cut mixes that the province might choose from, but to illustrate the extremely important point that it would appear possible for Albertans to "have their cake and eat it too." That is to say, it is possible to realize efficiency gains from lowering the income tax rate and replacing the forgone revenue with a sales tax, with or without a tax cut, without sacrificing distributional considerations.

To begin, a SRT/AST/STC mix that generates the same revenue as the 11% SRT will be analyzed. This will be followed by the analysis of two scenarios that would involve a tax cut.

5.1 A "6 and 5" Alternative

The complete replacement of the 11% SRT with an AST, with no STC program, would require a 9.5% AST rate. An AST imposed at this rate would increase the effective provincial commodity tax rate in Alberta to 11%, which is well above the national average of 6.6%. One alternative would be to impose an AST in Alberta that would merely raise the effective rate of commodity taxation in the province to the national average. If it is assumed that Alberta leaves its existing excise tax regime (which generates the existing 2.7% effective commodity tax rate) in place, an AST of 5% would generate an effective provincial commodity tax rate in Alberta roughly equal to the national average of 6.6%. To generate the same revenue as the 11% SRT, once behavioural adjustments in labour and savings markets are fully realized, this would require a SRT of about 5% (5.15% in the simulations).

Although the vertical equity implications of this AST/SRT configuration would be somewhat moderated vis-à-vis the complete elimination of the 11% SRT with a 9.5% AST, the consumable income of higher income households would still rise at the expense of lower income households, though to a lesser extent. To address this issue, a refundable STC could be introduced at the provincial level.

To maintain revenue neutrality, the introduction of the STC must be financed in some way. The simulations suggest that a one percentage point increase in the SRT rate, from 5% to 6%, would be sufficient to finance a refundable STC in Alberta that would for the most part offset the negative vertical equity implications of introducing a 5% AST.[20] The refundable Alberta STC that was simulated has the following characteristics: a credit of $225 per adult and $115 per child, with a supplemental credit of $115 for singles and loan parents, clawed back at a 5% rate for family incomes in excess of a threshold of $30,000. This "6 and 5" alternative would be roughly revenue neutral with the 11% SRT.

The average tax rates for the "6 and 5" alternative compared to the 11% SRT are very close – much closer than was the case with the 9.5% AST (see Figure 4.2). The configuration of average tax rates only begins to diverge in a substantive way at fairly high household income levels, with the 11% SRT being more progressive. If we compare the change in consumable

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Table 5.1
Annual Efficiency Costs of Taxes in the Labour Market, % of GDP

	Labour Supply Elasticity			Weighted Average Marginal Tax Rate
	0.05	0.15	0.25	
5% AST, 6% SRT, STC	1.4%	2.0%	3.2%	41.2%
9.5% AST	1.1%	1.6%	2.5%	37.0%
11% SRT	1.7%	2.3%	3.7%	44.1%

Table 5.2
Annual Efficiency Costs of Taxes in the Savings Market, % of GDP

	Savings Supply Elasticity			Weighted Average Marginal Tax Rate
	0.2	0.3	0.5	
5% AST, 6% SRT, STC	0.25%	0.44%	0.62%	40.7%
9.5% AST	0.16%	0.27%	0.39%	32.2%
11% SRT	0.33%	0.58%	0.83%	47.2%

income by household income groups for the "6 and 5" alternative vis-à-vis the 11% SRT, we find that although the gains in terms of consumable income are concentrated in the upper income groups, there is no negative change and even some gains in absolute terms in consumable income for all of the lower income groups.

As indicated above, the transfer of income from higher to lower income households associated with a STC comes at a cost in terms of efficiency. This occurs for two reasons. First, increasing the SRT rate from 5% to 6% raises the marginal tax rates for all taxpayers, which moderates the efficiency gains in both the labour and capital markets from introducing an AST. Second, the 5% clawback associated with the STC increases the effective marginal tax rate for middle income taxpayers. To investigate the implications of this, the efficiency gains from lowering the SRT from 11% to 6% and introducing a 5% AST in conjunction with a STC as described above was determined for both the labour and capital markets. The results are shown in Tables 5.1 and 5.2, which also reproduce the calculations for the 9.5% AST and 11% cases for convenience.

Note first from Table 5.1 that the weighted average marginal tax rate on labour income increases in the "6 and 5" alternative relative to the 9.5% AST, to 41.2% from 37%. This occurs for the reasons discussed above. However, the average marginal tax rate still remains less than the 44.1% rate under the 11% SRT. This is reflected in the efficiency cost calculations, which show that while annual efficiency costs in the labour market associated with the "6 and 5" alternative are higher than the 9.5% AST, there is still an efficiency gain relative to the 11% SRT. Thus, while the efficiency gains in the labour market from the "6 and 5" alternative are moderated somewhat, they are not completely dissipated. Using 1999 GDP and population estimates for the base case, efficiency gains in the labour market from replacing the 11% SRT with the "6 and 5" alternative are still about $260 per household per year.

Table 5.2 presents the analogous calculations for the

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9.5% AST	1.1%	1.6%	2.5%	37.0%
11% SRT	1.7%	2.3%	3.7%	44.1%

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Annual Efficiency Costs of Taxes in the Savings Market, % of GDP

	Savings Supply Elasticity			**Weighted Average Marginal Tax Rate**
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5% AST, 6% SRT, STC	0.25%	0.44%	0.62%	40.7%
9.5% AST	0.16%	0.27%	0.39%	32.2%
11% SRT	0.33%	0.58%	0.83%	47.2%

income by household income groups for the "6 and 5" alternative vis-à-vis the 11% SRT, we find that although the gains in terms of consumable income are concentrated in the upper income groups, there is no negative change and even some gains in absolute terms in consumable income for all of the lower income groups.

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Table 5.2 presents the analogous calculations for the savings market. Although there is a reduction in the annual efficiency gains in the "6 and 5" case vis-à-vis the 9.5% AST, the important point to note is that gains are not eliminated.

The total efficiency gains associated with the "6 and 5" alternative relative to the 11% SRT are about 0.5% of GDP, which is equivalent to about $375 per family per year in current dollars.

Experimenting with different SRT, AST, STC combinations would obviously produce different results. However, the very important insight from the above analysis is that ***it is possible to introduce a sales tax to partially replace the income tax in Alberta in a manner that would not decrease the consumable income of the average households in the lower household income groups, but would still generate efficiency gains in the labour and savings markets.***

5.2 Tax Cut Scenarios

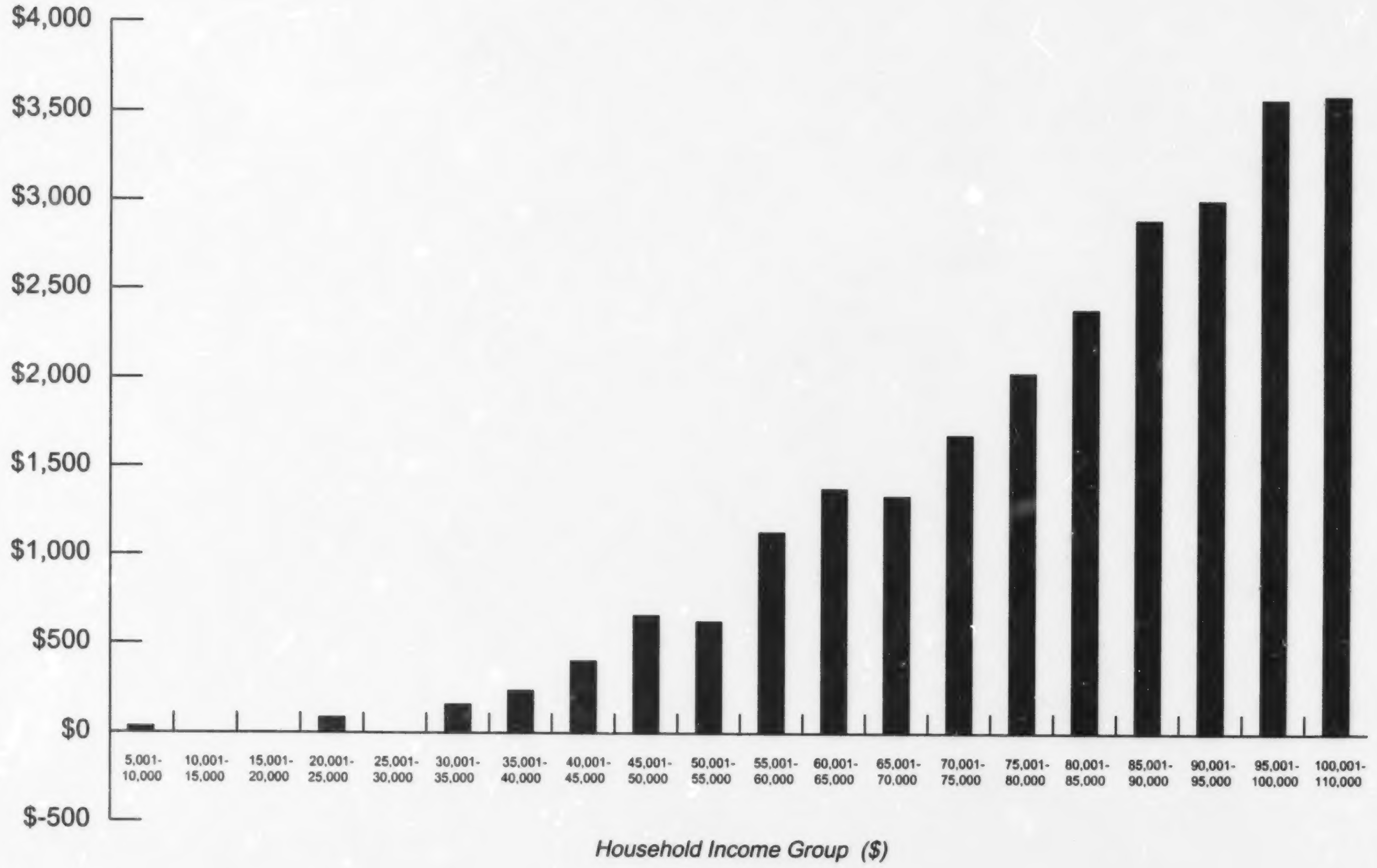
To this point, the tax configurations considered in the study have been designed to be revenue neutral with respect to the 11% SRT. It is also useful to consider scenarios that involve the delivery of a tax cut in conjunction with the introduction of a sales tax to replace, either completely or partially, the Alberta income tax. In many ways, this may in fact be a more accurate description of the relevant policy landscape in the near future, as some policy analysts have suggested that there is substantial room for further tax cuts in Alberta, over and above the cut that will occur as a part of the introduction of the 11% SRT in 2001.

For example, a recent report by John McCallum, Senior Vice-President and Chief Economist of the Royal Bank of Canada, analyzes the "fiscal power" of the federal government and the provinces (see McCallum 1999). Fiscal power refers to the ***fiscal dividend*** that looms on the horizon for most of the provinces and Ottawa due to the fiscal retrenchments that have occurred over the past several years. To calculate the fiscal dividends that may be available to the various governments over the next several years, McCallum assumes that government revenues grow at the same annual rate as ***nominal*** GDP (assumed to be 5.3% per year in Alberta's case) while provincial program expenditures rise with inflation and population growth so as to keep real per capita spending constant (a nominal growth rate of 3.4% per year in Alberta's case). He then calculates the excess of revenues over spending in 2004/05 and 2007/08 arising from these assumptions; this excess is the fiscal dividend. After building in a "prudence adjustment," McCallum suggests that by 2004/05 the fiscal dividend in Alberta should be the highest of all of the governments in Canada, and would be enough to deliver a personal income tax cut of over 40%, equivalent to about $1.5 billion in fiscal year 1999/00. It should be stressed that McCallum's calculation holds real per capita program spending constant, so that under his assumptions this cut could be implemented without a reduction in government services.

While McCallum's calculations are obviously rough, they do suggest scope for fairly sizable tax cuts in Alberta without impinging upon government program spending. In light of this possibility, two scenarios are considered below for replacing the income tax in Alberta with a sales tax in conjunction with a tax cut. Both scenarios involve the introduction of an 8% AST in Alberta. This rate was chosen because it is equal to the sales tax rate in several Canadian provinces, including the HST in the Atlantic provinces, and might be considered the "maximum tolerable" sales tax rate for Alberta. One scenario couples the 8% AST rate

Figure 5.1

Change in Consumable Income per Household: 8% AST/STC vs. 11% SRT



Source: Author's calculations using the SPSD/M.

Table 5.3
Annual Efficiency Costs of Taxes in the Labour Market, % of GDP

	Labour Supply Elasticity			Weighted Average Marginal Tax Rate
	0.05	0.15	0.25	
5% AST, 6% SRT, STC	1.4%	2.0%	3.2%	41.2%
9.5% AST	1.1%	1.6%	2.5%	37.0%
11% SRT	1.7%	2.3%	3.7%	44.1%
8% AST, 2% SRT, STC	1.2%	1.7%	2.7%	38.26%
8% AST, STC	1.1%	1.6%	2.5%	36.5%
10% SRT	1.6%	2.2%	3.5%	43.0%
8% SRT	1.5%	2.0%	3.2%	41.1%

Note: The first three scenarios are revenue neutral with each other. The 8% AST, 2% SRT, STC scenario is revenue neutral with the 10% SRT, and the 8% AST, STC scenario is revenue neutral with the 8% SRT scenario.

with a 2% SRT, the other scenario involves the complete elimination of the Alberta income tax. In each case, a refundable STC program is introduced that would leave average consumable income for each household income group at least as high as it would be under the 11% SRT. The Alberta STC that was simulated has the following characteristics: a credit of $325 per adult and $165 per child, with a supplemental credit of $165 for singles and lone parents, clawed back at a 5% rate for family incomes in excess of a threshold of $30,000.

The introduction of an 8% AST coupled with the introduction of a STC and reduction in the SRT from 11% to 2% would lower tax revenues in 2001 dollars by about $350 million; just over half of the size of the tax cut envisioned with the introduction of the SRT in 2001, and just over 2% of total revenues. The introduction of an 8% AST coupled with the introduction of a STC and the complete elimination of the SRT would lower tax revenues by about $850 million, which amounts to a tax cut of just under 5% in 2001 terms. Both tax cuts are much lower than the fiscal dividend forecasts of McCallum.

Figure 5.1 shows the average change in consumable income in moving from the 11% SRT to the second scenario. (A similar pattern would result from the first scenario.) The STC program used in the simulations was chosen to be just sufficient to ensure that on average no household income group would suffer a reduction in consumable income vis-à-vis the 11% SRT case. Under this assumption, it is clear from the figure that high income households would still enjoy a fairly sizable increase in consumable income. By increasing the STC further, more of these gains could be transferred to lower income households. The figure emphasizes once again, however, that an AST could be introduced in Alberta to replace the province's share of the personal income tax, this time in conjunction with a tax cut, ***without reducing the consumable income of low income households.***

Table 5.3 shows the efficiency costs in the labour market of these configurations as a percentage of GDP. Previous scenarios are shown for convenience and comparative purposes. Also included in the table are calculations of the efficiency costs in the labour market associated with two alternative SRT scenarios. A 10% SRT would lower tax revenues by about $350 million and an 8% SRT

Table 5.3

Annual Efficiency Costs of Taxes in the Labour Market, % of GDP

	Labour Supply Elasticity			Weighted Average Marginal Tax Rate
	0.05	0.15	0.25	
5% AST, 6% SRT, STC	1.4%	2.0%	3.2%	41.2%
9.5% AST	1.1%	1.6%	2.5%	37.0%
11% SRT	1.7%	2.3%	3.7%	44.1%
8% AST, 2% SRT, STC	1.2%	1.7%	2.7%	38.26%
8% AST, STC	1.1%	1.6%	2.5%	36.5%
10% SRT	1.6%	2.2%	3.5%	43.0%
8% SRT	1.5%	2.0%	3.2%	41.1%

Note: The first three scenarios are revenue neutral with each other. The 8% AST, 2% SRT, STC scenario is revenue neutral with the 10% SRT, and the 8% AST, STC scenario is revenue neutral with the 8% SRT scenario.

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Table 5.4
Annual Efficiency Costs of Taxes in the Savings Market, % of GDP

	Savings Supply Elasticity			***Weighted Average Marginal Tax Rate***
	0.2	**0.3**	**0.5**	
5% AST, 6% SRT, STC	0.25%	0.44%	0.62%	40.7%
9.5% AST	0.16%	0.27%	0.39%	32.2%
11% SRT	0.33%	0.58%	0.83%	47.2%
8% AST, 2% SRT, STC	0.18%	0.32%	0.46%	34.9%
8% AST, STC	0.16%	0.27%	0.39%	32.2%
10% SRT	0.31%	0.54%	0.77%	45.5%
8% SRT	0.27%	0.48%	0.68%	42.7%

Note: The first three scenarios are revenue neutral with each other. The 8% AST, 2% SRT, STC scenario is revenue neutral with the 10% SRT, and the 8% AST, STC scenario is revenue neutral with the 8% SRT scenario.

would lower revenues by about $850 million relative to the 11% SRT. These scenarios are included to separate the efficiency gains arising from the structural change in the tax system associated with the replacement of the personal income tax with the AST from the gains associated with the reduction in tax revenue.

Table 5.3 shows that the replacement of the 11% SRT with an 8% AST and 2% SRT (with a STC), which would involve a tax cut of only $350 million, would lower efficiency costs in the labour market by a little less than the revenue neutral introduction of an AST at a 9.5% rate. The difference, of course, is that in the case of the 8% AST and 2% SRT the STC would moderate the impact of the AST on low income households. Thus, introducing an 8% AST coupled with a small SRT and a STC can generate still significant efficiency gains with only a modest tax cut. Comparing this scenario to a reduction in the SRT rate to 10%, which also lowers tax revenue by about $350 million, we see that most of the efficiency gains come from the change in the tax mix rather than the tax cut itself. Table 5.4 shows that essentially the same conclusions apply to the savings market.

6. Other Issues

The previous sections have focused on issues related to the efficiency and equity implications of changing the tax mix in Alberta by lowering the income tax rate and introducing a consumption tax. In that discussion, an attempt was made to quantify those implications where possible. There are many other important issues associated with the introduction of a general sales tax in Alberta which do not lend themselves to easy quantification. Some of these would increase the attractiveness of replacing the personal income tax in the province with an AST, and might be thought of as "gravy" over and above the benefits documented above; others would tend to decrease the attractiveness of a sales tax. The purpose of this section is to briefly address these issues.

6.1 Labour Migration and the Brain Drain

There has been a great deal of media attention in Canada regarding the so-called "brain drain" which concerns the migration of skilled Canadian workers to the US. There also appears to be a general lack of understanding

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6.1 Labour Migration and the Brain Drain

There has been a great deal of media attention in Canada regarding the so-called "brain drain" which concerns the migration of skilled Canadian workers to the US. There also appears to be a general lack of understanding regarding the size of the problem, or even whether a problem exists at all. Nonetheless, a recent poll suggested that over 80% of Canadians are worried about the brain drain and think that tax cuts would help address the problem. Unfortunately, there has been little in the way of academic research concerning the issue of the brain drain, or the role that the tax system may play in contributing to it.

Most of the research that has been done suggests that although in terms of absolute numbers Canada tends to lose skilled workers to the US, this is more than made up by a net immigration of skilled labour from the rest of the world, and the numbers are relatively small in any event (Statistics Canada 1999a). Although it is difficult to control for "quality" differences between in and out migrants, this does not seem indicative of a serious problem, at least not yet. At the same time, studies have also shown that highly skilled individuals are the most likely to leave the country (Statistics Canada 1999b). This is indicative of a greater degree of mobility for skilled labour than unskilled labour. An old adage in taxation is that "it is difficult to tax what won't stand still." And indeed, as has been shown in the previous section, the more responsive (mobile) a tax base is to the tax rate, as reflected in its elasticity, the greater the efficiency costs. Since skilled individuals tend to earn higher incomes than unskilled individuals, this suggests that the reduction in tax rates for high income groups under an AST would act to help stem any brain drain, if one exists.

Perhaps particularly relevant from Alberta's perspective is a recent study from Statistics Canada that shows that the US state most likely to attract skilled workers from Alberta is Texas. As discussed in the introduction, Texas is an oil and gas dependent state with an industrial structure similar to Alberta, and might be considered a logical destination for Albertan "brains to drain." Texas imposes a 6.5% sales tax with no state income tax.

The analysis of the previous section suggests that there is no need to rely on brain drain arguments to justify the replacement of the provincial income tax with a sales tax in Alberta on efficiency grounds. Nonetheless, to the extent that a problem does exist, and that taxes in some way contribute to it, clearly a change in the tax mix towards consumption taxation could play some role in decreasing the problem.

Losing skilled workers to the US is one thing, losing them to another province is quite another. Skilled labour is much more mobile inter-provincially than internationally, and, as such, Alberta's tax system vis-à-vis other provinces is always an important consideration. None of the calculations in sections 4 or 5 allowed for an increase in net migration into Alberta arising from the change in the tax mix. This is because the magnitude of any changes would be difficult to quantify. Yet it is entirely possible that some migration of skilled labour into Alberta would occur due to the change in the tax mix and the associated reduction in income tax rates.

Table 2.1 in section 2 showed the existing statutory marginal effective tax rates for individuals with various levels of income in Alberta and the other provinces. Under the 11% SRT, the combined federal/provincial top marginal tax rate in Alberta will be 41.4% vs. 47.9% in Ontario, the next lowest province. The replacement of the Alberta income tax with a 9.5% AST would reduce the top Alberta rate to 30.4%, 17.5 ***percentage points*** lower than the top Ontario rate. This is the sort of "Alberta Advantage" that is more likely to attract high income, high skilled labour than the existing "Alberta Advantage" with respect to sales taxes.

This is particularly true of so-called "knowledge workers" employed in the "knowledge sector." These individuals tend to be highly skilled, earn high incomes, and are very mobile. Introducing an AST, and the concomitant reduction in marginal tax rates, may go a long way to addressing concerns over a lack of a well developed "knowledge sector" in Alberta.

There have been no studies of the impact of taxation specifically on the mobility of skilled labour in Canada. However, a study by Day and Winer (1994) suggests that inter-provincial migration in aggregate is somewhat sensitive to tax differentials between provinces. All of this points towards a net increase of skilled labour in Alberta due to a change in the tax mix in favour of consumption taxation.

6.2 Integration, Small Businesses and Entrepreneurism

It was suggested in section 4 that the introduction of an AST would be unlikely to generate a significant increase in business investment in Alberta. This argument was based in part on a small open economy with mobile capital, which suggests a disconnect between the supply and demand side of the capital market. But even in the case where the domestic equity market is "closed" and restricted to domestic shareholders only, neoclassical investment theory suggests that any change in business investment due to the AST would likely be quite small.

Some argue, however, that standard neo-classical investment theory does not adequately capture the financial market characteristics of small businesses and entrepreneurs. Entrepreneurs, it is argued, raise money the hard way – by giving equity interests to venture capital investors. It is not easy to get investors to put money into risky, innovative businesses, and the venture capital market is rife with market failures, primarily of an informational nature. The question is: does the existing tax system exacerbate these problems? Would a change in the tax system help alleviate them? This is a difficult question. As stressed in section 4, even venture capital investors have opportunity costs given by the internationally determined "normal" interest rate; entrepreneurs must compensate these investors both for giving up this rate of return and for the additional risk associated with investing in their business. Although the reduction in taxes on the return to savings associated with replacing the personal income tax in the province with an AST may generate some entrepreneurial activity, the relative change in the tax rate on interest and equity income suggested by the movement to an AST simply does not appear to be substantial enough to generate a small business investment boom even for the riskiest enterprises. As discussed in the next section, however, the change in the tax mix may act to spur investment in a different type of capital – human capital.

One issue that does merit further discussion is the impact of reducing the SRT and introducing an AST on the degree of integration between the corporate and personal income tax systems. The presence of a separate personal and corporate tax suggests the possibility that income earned at the corporate level and passed onto shareholders as dividends or capital gains will be subject to double taxation – once at the corporate level under the corporate income tax, and then again at the personal level under the personal income tax. One way of dealing with this is to integrate the corporate and personal tax systems. As discussed in section 4, and the technical appendix, Canada uses a gross-up and credit approach to dividend taxation that is intended to (at least partly) eliminate the double taxation of dividends by giving taxpayers notional credit for taxes paid at the corporate level on dividends distributed to individuals. The 75%

Table 6.1
Total Effective Tax Rates on Dividends, Capital Gains and Ordinary Income

	CCPC	Large Manufacturing	Large Non-Manufacturing	Ordinary Income
11% SRT				41.45%
Dividends	40.08%	53.33%	59.47%	
Capital Gains	39.46%	52.56%	58.54%	
9.5% AST				30.45%
Dividends	29.68%	44.49%	51.85%	
Capital Gains	33.76%	48.09%	54.64%	

Note: Assumes corporate tax rates of 19.12% for CCPCs, 36.62% for large manufacturing, and 44.62% for large non-manufacturing corporations.

inclusion rate for capital gains can be interpreted as a rough way to integrate capital gains.

The Canadian approach to integration has been to achieve the full, or close to full, integration of both dividends and capital gains for small privately held businesses, CCPCs (Canadian Controlled Private Corporations), but not for large public corporations. The reason for the distinction between small and large businesses is that small businesses (CCPCs) are subject to lower corporate tax rates than are large businesses. Since the same dividend tax credit is given for all dividends, regardless of whether they are received from a CCPC or a large corporation, full integration of CCPCs suggests the under integration of dividends received from large businesses (i.e., dividends received from non-CCPCs are subject to some degree of double taxation). Similarly, 75% of all domestic capital gains are included in personal income, regardless of source. The focus on full integration at the small business level arises because of the enhanced discretion of these businesses to flow income to their owners in the form of wages, dividends or capital gains.

How would the reduction in the income tax rate that would accompany the introduction of an AST affect the degree of integration in the Canadian tax system? As discussed in the appendix, to answer this question we need to know the ***total*** (nominal) effective tax rate on dividends and capital gains. This is the combined personal plus corporate rate of tax paid on dividends and capital gains distributed to shareholders, which takes account of the dividend tax credit granted at the personal level, the 75% rule, and deferral effect for capital gains (see McKenzie and Thompson 1997). If the total effective tax rate on dividends is equal to the personal tax rate on ordinary income, then the tax system is perfectly integrated, as owners of CCPCs would be effectively indifferent about receiving payment in the form of wages or dividends; similarly for capital gains. If the total effective tax rate on dividends is less than the tax rate on ordinary income the tax system is over integrated; if the tax rate on dividends is greater than the tax rate on ordinary income the tax system is under integrated.

Table 6.1 shows the total effective tax rate on dividends and capital gains received from CCPCs, large manufacturing corporations and large non-manufacturing corporations for high bracket Albertans under the 11% SRT and its replacement with a 9.5% AST. Also shown is the high bracket marginal tax rate on ordinary income for each scenario.

Table 6.1 shows that the total effective tax rate on both dividends and capital gains is roughly equal to the tax rate on ordinary income under the 11% SRT for CCPCs. Thus, under the 11% SRT regime, both dividends and capital gains are virtually fully integrated for small corporations. While the total effective tax rate on dividends and capital gains are close to each other in the two large corporation cases, in each case the effective tax rates are more than the tax rate on ordinary income. Hence, the dividends and capital gains received from large corporations in Alberta are under integrated.

Table 6.1 also shows that the elimination of the 11% SRT and its replacement with a 9.5% AST maintains the rough equality between the total effective tax rate on dividends for CCPCs and ordinary income. Thus, dividends from CCPCs would continue to be fully integrated under the replacement of the personal income tax in Alberta with an AST. However, the total effective tax rate on capital gains from CCPCs rises to over three percentage points above the tax rate on ordinary income. This suggests that, all else equal, shareholders of CCPCs in Alberta would prefer to receive income in the form of wages or dividends rather than capital gains if the provincial income tax is eliminated and replaced with an AST.

6.3 Income and Growth

Although the subject of much discussion and analysis, in both academic and policy/media circles, the relationship between economic growth and taxation is a controversial issue in economics, and no wide-spread consensus has emerged. This section will speculate on some of the potential growth implications of changing the tax mix.

To begin, however, it is useful to first look at the impact of the change in the tax mix on the ***level*** of total income in the province in the steady state, as measured by the Gross Domestic Product (GDP). As suggested throughout much of the previous discussion, any increase in provincial GDP from introducing an AST would come from the increased efficiency of labour markets. While there would be efficiency gains in savings markets due to decreased distortions in the intertemporal budget constraint, these gains would not manifest themselves in significantly higher steady state output (GDP) because of the disconnect between savings and investment. The increase in labour supply due to the reduction in marginal tax rates on labour income, on the other hand, would manifest itself in higher provincial GDP.

As indicated in section 4, under the base case assumptions used in the simulations, the complete elimination of the Alberta income tax and its replacement with a 9.5% AST would increase steady state labour income vis-à-vis the "current" system by about 2%. Assuming that labour's share of GDP is in the neighbourhood of two-thirds, this suggests that steady state GDP would increase by about 1.3% ***even with no additional migration effects and no growth effects***.

As suggested above, there is a great deal of uncertainty regarding the impact of taxes and the tax mix on economic growth. Indeed, in the standard neo-classical growth model of the Solow type, taxes have no impact on long-run growth rates because economic productivity – the driving force behind per capita growth – is presumed to be exogenous. However, there may be some temporary growth effects as the economy moves to a new steady state equilibrium. More recently, so-called ***endogenous growth models*** have emerged whereby productivity growth emerges endogenously in the economy as a result of optimizing decisions on the part of firms and individuals and spillovers to other parts of the economy resulting from those decisions. This suggests the potential for tax policy to affect long-run growth through its impact on productivity. Taxes can affect productivity and growth through several channels. One of the most important for our purposes is increased productivity due to more investment in ***human capital***.

Empirical tests of endogenous growth models, some of which consider taxation, have provided mixed results, and are beset with econometric difficulties. However, a recent econometric investigation of growth rates in OECD countries by Kneller, Bleaney and Gemmell (1999) concludes that a switch from income to consumption taxes will increase the growth rate.

Other insights from the endogenous growth literature have come from simulation models. Many of these models suggest that changing the tax mix away from income taxation and in favour of consumption taxation increases long-run growth rates. One of the reasons for this is the impact on individual incentives to invest in human capital. High tax rates on labour income discourage individuals from investing "in themselves" via things like advanced education. This is because much of the return to this investment is taxed away by the government via high marginal tax rates. Consumption taxes such as the AST envisioned here lower the marginal tax rates at the higher end of the income scale, which increases the private return to investment in human capital. Some endogenous growth models suggest that this may manifest itself in significantly higher long-run growth rates (for a recent example, see Wynne 1997).

In sum, although it is difficult to quantify the impact of changing the tax mix in Alberta on provincial growth, there are two mechanisms by which an increase in growth may be realized. First, as the labour market adjusts to the changing tax mix, which may take some time, the increased labour supply could manifest itself in higher ***short-term*** growth rates as the economy moves to its new steady state. Second, by increasing the return to human capital investment, productivity may increase, which would manifest itself in a higher ***long-run*** growth rate.

6.4 Administration, Compliance, Evasion

In section 3 it was indicated that three normative criteria are typically invoked to evaluate the "desirability" of a particular tax regime or tax mix: efficiency, equity, and administration and compliance. The bulk of the study has focused on efficiency and equity considerations. This section very briefly considers the issue of administration and compliance, and the related issue of tax evasion and the underground economy.

Because Alberta does not currently have a sales tax, an administrative framework would need to be established to collect and administer an AST; this would generate administration costs for the government. Moreover, because Alberta businesses do not currently collect sales taxes on behalf of the province, the introduction of an AST may also have implications for the cost of complying with the tax system.

A recent paper by Plamondon and Zussman (1998) summarizes previous research and presents some new results on the costs to business of ***complying*** with various parts of the tax system in Canada. They report that estimates of the compliance costs associated with the federal GST in 1996 range from $600 million to $1.2 billion. This works out to an annual compliance cost of between 3% and 6% of GST revenues. This is significantly below VAT compliance costs in other countries, where average compliance costs are estimated to be in the neighbourhood of 10.5% of revenues.

Because the AST as envisioned in this study would be fully harmonized with the federal GST, the incremental costs for businesses of complying with the AST would likely be minimal, provided that the AST is administered by a centralized agency, at either the federal or provincial level.

Estimates of the cost of ***administering*** the GST vary. Revenue Canada puts the cost at about 3% of revenues collected, which would be $600 million in 1996. The costs of administering an AST in Alberta would depend upon the way in which it is harmonized with the federal GST. There are two models of harmonization in Canada that could be followed. The first is the Harmonized Sales Tax (HST) approach adopted by three of the Atlantic provinces (New Brunswick, Nova Scotia and Newfoundland). The HST is an augmented version of the GST whereby the federal government applies a tax rate of 15% on transactions in the three Atlantic provinces rather than the 7% that it applies in the rest of the country. The provinces' share of the revenues collected are then turned over to them in proportion to the final consumption expenditures in each province. The HST is administered by the federal government as a part of its administration of the GST. One option would be to administer the AST in a way similar to the HST, with the federal government collecting and administering the tax on behalf of the province. This, of course, would entail no additional administration costs on the part of the province. The problem with the HST approach to harmonization is that Alberta would have to abide by the 8% provincial rate established by the federal government, and would therefore sacrifice a good deal of tax policy independence. This may well render this approach to harmonization unacceptable in an Alberta context.

The other approach to harmonization would be to follow the Quebec lead. The Quebec Sales Tax (QST) is a multi-stage VAT that was largely harmonized with the federal tax in 1991 when the GST was implemented. Amendments in 1996 increased the degree of harmonization even further, so that now the two systems are virtually identical in terms of base. The QST and GST are administered and collected at the provincial level by the Quebec Ministry of Revenue (MRQ), with the federal government paying some compensation. Quebec has complete autonomy over the QST rate.

The QST approach to harmonization, whereby a province effectively establishes its own VAT alongside the federal GST, is referred to as a ***dual VAT*** system. The main issue that arises with a dual VAT from an administrative perspective has to do with cross-border transactions in a federation such as Canada where there are no border controls between provinces that allow for the collection of taxes on imports. In a dual VAT this is handled by a self-assessment system whereby firms that sell to purchasers outside of the province do not collect the provincial VAT, but still collect the GST. Similarly, firms that purchase inputs from outside of the province do not pay the provincial VAT on their purchases, and therefore receive no input tax credits for provincial VAT purposes on out of province purchases. Bird and Gendron (1998) analyze the dual VAT and argue that it may be the best approach to harmonization in federations such as Canada.

The dual VAT approach would also appear to be the best approach to harmonization for the AST. It allows the province to realize the benefits of a multi-stage sales tax while maintaining autonomy over the tax rate. While HST type harmonization would require very little in the way of administration costs at the provincial level, the imposition of a dual VAT in Alberta would require establishment of a tax administration apparatus in Alberta. As is the case in Quebec, the province could expect to be compensated by the federal government for its collection of the GST. On the basis of current estimates, if Alberta were to administer the AST on its own, collecting both it and the GST in exchange for some compensation from the federal government, it is unlikely that the ***net*** provincial administration costs would exceed 2% of revenues, which is less than $8 million per year at current levels.

Costs associated with the administration of a refundable STC in Alberta would also be quite modest, as it is envisioned to mirror the federal sales tax credit. Under the new Tax Collection Agreement, the federal government would likely administer this program for a nominal fee.

One of the concerns when designing a tax system is the extent to which tax design, and the tax mix, contribute to problems of tax evasion. Estimating the amount of tax evasion, and the size of the underground economy, much less determining the role that the tax mix plays in evasion, is very difficult. A recent study by Hill and Kabir (1996) suggests that the size of the underground economy in Canada has been growing since the late 1980s, and that both federal and provincial income taxes and sales taxes (RSTs at the provincial level and the GST at the federal level) have contributed to this growth.

Of direct relevance to this study is the issue of whether indirect taxes, such as sales taxes, encourage tax evasion more or less than direct taxes, such as income taxes. Specifically, would a change in the tax mix in favour of indirect (consumption) taxation increase or decrease the amount of tax evasion in Alberta? Hill and Kabir found no evidence to suggest that a change in the tax mix would change the amount of tax evasion in Canada. This suggests that substituting the AST for the SRT would have little or no impact on evasion.

A related issue concerns cross-border shopping. Currently, Alberta businesses may be a small beneficiary from cross-border shopping visits from the residents of its two provincial neighbors, British Columbia and Saskatchewan, who levy sales taxes of 8% and 6% respectively. While there are no studies of the magnitude of this phenomenon, it is unlikely that it is substantial in aggregate, though it could be important in some border communities. Depending upon the tax configuration adopted, the Alberta sales tax rate on most goods would be either higher or lower than the sales tax rates in Saskatchewan and B.C., though the sales tax rate on services would be higher as most services are not taxed under the provincial retail sales taxes imposed in those provinces. To the extent that services are largely "non-tradable" in any event, at least relative to goods, the higher sales tax rate on services should not pose a serious problem.

Alberta borders on Montana in the US. As indicated in section 2, Montana levies no state sales tax, though it does impose an income tax (the highest in the country). While there may be potential for some cross-border shopping trips of Albertans into Montana, again this is unlikely to be a matter of substantial concern from an aggregate perspective, and may be moderated by enhanced tax collection efforts at the border if it becomes a problem.

To conclude this section on compliance and administration, a brief discussion of the treatment of electronic commerce and the Internet under a sales tax are in order. This is a very complex issue that is currently challenging tax collectors and tax policy makers around the world as the importance of goods and services traded on the Internet grows. Only a few of the issues will be raised here.

To begin, it is useful to describe briefly what falls under the rather vague heading of "electronic commerce." Much of electronic commerce as it currently exists consists of the ordering of physical, ***tangible goods*** for delivery to the consumer. In this respect, the Internet has dramatically reduced the marginal costs associated with "mail order" type marketing and sales. However, the use of the Internet to provide two types of ***intangible goods and services*** is growing. The first consists of traditional services that are simply delivered via a different medium, such as financial services, telecommunication services, etc. The second consists of digitalized content, including compact disks, videos, games, software, and books. In the case of intangible goods and services, the "product" itself is delivered via the Internet, either as a service or in terms of content. The distinction between tangible and intangible and services has in fact become somewhat blurred with the advent of electronic commerce.

As a general policy matter, the principles that determine any "good" sales tax should apply equally to electronic commercial transactions and "traditional" commercial transactions – namely the sales tax should be destination based, uniform, comprehensive, and not applied to business inputs. These guiding principles should dictate the design of the AST, both generally and with respect to its application to electronic commerce.

While there are obviously additional complications, many of the challenges posed for tax policy by the advent of the Internet are not new on a conceptual level. What is new is the sheer volume of relevant transactions due to the substantial reduction in transaction costs. Thus, conceptually, the web based ordering of tangible goods poses problems similar in nature to any "mail order" sale. Similarly, intangible services provided over the Internet pose the same measurement problem facing the taxation of any service – witness the difficulties in taxing financial services even when they are provided using "conventional" means. Digital content delivered over the Internet may pose the greatest challenge from an administrative point of view, but it is just another, exceptionally fast, cheap and efficient, distribution mechanism.

Charles McLure (1997) suggests that the general principles identified above should apply equally to both electronic and "traditional" commerce to the extent that it is feasible, and economical, to do so. As such, all sales to final consumers, whether tangible, intangible, a good or a service, should be taxed. All sales to business should be tax free. Thus, business purchases from out of province vendors over the Internet should not be subject to tax, while purchases from "local" vendors should be subject to the same credit and invoice treatment as all business transactions. Finally, sales by out of province vendors to final consumers in the province, regardless of the form, should be taxed. McLure suggests that for administration reasons either or both of a physical presence test or a ***de minimis*** test may be applied to ease the collection burden on small businesses. This approach is currently applied under the GST and could be applied, and possibly enhanced, in the case of electronic commerce.

The challenges to tax collectors and tax policy makers posed by electronic commerce and the Internet are not trivial. Nor are they confined to sales and consumption taxes, as numerous issues also arise in connection with the income tax. However, there is no reason to believe that these challenges cannot be met in the implementation of a sales tax in Alberta in cooperation with the governments of other jurisdictions.

7. Concluding Remarks

Two questions were posed at the beginning of the study: would it be possible to replace the provincial personal income tax in Alberta with a sales tax, and, if possible, would it be desirable? We are now in a position to answer these questions.

The analysis has shown that it is certainly ***possible*** to introduce a sales tax in Alberta to replace the province's share of the personal income tax. As envisioned, such a tax would be levied on the federal GST base and would involve the imposition of a dual VAT in Alberta based upon the Quebec model. Several scenarios were considered. An Alberta Sales Tax (AST) rate of about 9.5% would be required to completely eliminate the personal income tax in Alberta, raising approximately the same revenue as the 11% Single Rate Tax (SRT) that will be imposed in 2001. Partial replacement scenarios were also considered. For example, a 5% AST coupled with a 6% SRT would also be approximately revenue neutral with the 11% SRT. Finally, scenarios involving the introduction of an AST to replace the personal income tax in conjunction with an overall tax cut were considered. For example, an 8% AST coupled with a 2% SRT would involve a tax cut of approximately $350 million vis-à-vis the 11% SRT (in 2001 dollars); an 8% AST with the complete elimination of the SRT would involve a tax cut of approximately $850 million.[21]

None of these scenarios or tax configurations are "beyond the pale" in the sense that they involve unrealistically high sales tax rates or tax cuts. Current provincial retail sales tax rates, levied on various bases, range from 6% to 8%. Moreover, recent analysis out of the Royal Bank of Canada suggests that tax cuts of the magnitude suggested above ($350 million and $850 million) could be easily implemented in Alberta without reducing real per capita program spending (see McCallum 1999). This is possible as Alberta begins to reap the benefits of the expenditure cuts and debt repayment initiatives of the past several years – the "fiscal dividend" associated with fiscal retrenchment.

The question of whether or not such a change in the tax system in Alberta would be ***desirable*** is more difficult. The analysis suggests that the most straightforward replacement scenario – complete elimination of the provincial personal income tax and its replacement with a 9.5% AST – would generate significant efficiency gains in both labour and capital markets, in the order of 1% of GDP per year ($850 per family per year in current dollars). This is clearly desirable. However, this scenario also gives rise to what many would consider to be undesirable distributional implications, as the consumable income (income less all taxes) of higher income groups would increase at the expense of lower income groups.

An extremely important result of the analysis, however, is that it appears to be possible to realize some of the efficiency gains of replacing at least a portion of the province's share of the personal income tax with a sales tax without impinging upon the consumable income of lower income households. In other words, the analysis suggests that the province can achieve a desirable outcome from both an efficiency and equity perspective; Albertans can "have their cake and eat it too." This can be accomplished by implementing a refundable sales tax credit (STC) in Alberta in conjunction with the introduction of an AST. This STC program can be designed so that average consumable income for each household income group would not fall, and indeed would rise in most cases, relative to the 11% SRT. While such a program would lower the efficiency gains associated with the complete replacement of the income tax, the key insight is that it would not completely dissipate the efficiency gains.

Financing a STC program with a tax cut would dissipate the efficiency gains even less. For example, an 8% AST with no SRT and a STC, which would involve a tax cut of about $850 million, would generate an efficiency gain roughly equal to the 9.5% AST scenario with no STC. The analysis suggests that most of the efficiency gains in the tax cut scenarios come from the change in the tax mix rather than the reduction in the tax take.

Other AST/SRT/STC configurations are possible. For example, a more generous STC program could be implemented to transfer more of the gains to lower income households. This would, of course, reduce the efficiency gains of changing the tax mix even more. But, the key insight offered by the analysis is that ***changing the tax mix in Alberta in favour of consumption taxation can generate efficiency gains without sacrificing distributional considerations.***

Coupling these efficiency gains with other potentially positive results that could emanate from the replacement of the income tax with a sales tax – particularly the potential growth effects due to an increase in the return to human capital that could manifest itself in a growing "knowledge" sector in Alberta – suggests that at least the partial replacement of the personal income tax with a sales tax in Alberta would be desirable from an economic perspective.

The issue of the transition towards a new tax regime in Alberta was not specifically addressed in the study. However, the results summarized above suggest a natural transition towards the complete elimination of the provincial personal income tax in Alberta. For example, a revenue neutral partial substitution of the AST for the personal income tax – of the nature of the 5% AST and 6% SRT scenario discussed above – could be implemented in conjunction with a STC program aimed at lower income households. As the efficiency gains from this change in the tax mix were realized, and the fiscal dividend associated with fiscal retrenchment grew, the sales tax rate could be increased slightly and the SRT reduced even more. This could be done with an eye to completely eliminating the personal income tax, with a sales tax in the 8% range, while reducing the overall taxes paid by Albertans. Implementing a tax reduction in conjunction with the introduction of a sales tax to replace the personal income tax would not only be economically sensible, but perhaps politically attractive as well.

Another issue not directly addressed in the study is what to do about the Alberta corporate income tax (CIT). One of the reasons for having a CIT is that it serves as a "backstop" for the personal income tax, taxing income as it accrues at the corporate level that may otherwise escape taxation at the personal level. If the provincial income tax at the personal level is eliminated, this rationale for the CIT disappears. There may, however, be other reasons for maintaining a CIT in the absence of a personal income tax. One is to capture economic rents that accrue at the corporate level. While this is a legitimate justification in principle, the existing CIT in Canada, and Alberta, is far from a tax on economic rents. Another reason for keeping the CIT even in the absence of a personal income tax, is that its elimination would result in a transfer to foreign government treasuries, primarily the US and otherwise, as its elimination would simply lower the tax credits that are provided to foreign subsidiaries operating in Canada.

The point is that if the provincial share of the personal income tax is eliminated, then the justification for the continued existence of the CIT is substantially weakened. Moreover, the elimination of the CIT could generate significant efficiency gains on the demand side of the capital market. While this study has focused on the replacement of the personal income tax with a sales tax, there is clearly scope for realizing even greater efficiency gains from eliminating, or reducing, the CIT.

Regardless of whether or not the goal of totally eliminating the province's share of the personal income tax is ultimately achieved, thereby making Alberta the only ***income tax free*** province in the country, the analysis suggests that a change in the tax mix towards a greater reliance on consumption taxes and a lesser reliance on personal income taxes would be desirable from both an efficiency and equity perspective. The question is not so much what are the implications of replacing (completely or partially) the provincial personal income tax with a sales tax, but rather ***what are the costs of not doing so?*** The analysis suggests that Albertans are bearing substantial costs in terms of personal income by refusing to exchange a general sales tax for lower personal income taxes; the cost is in the order of $375-$850 per family per year, depending upon the scenario.

Economists often invoke the absence of the mythical "free lunch" when explaining the typical trade-off that arises between equity and efficiency in the design of the tax system. The analysis undertaken in this study suggests that by changing the tax mix in the province away from income taxation and towards consumption taxation, Albertans can obtain the closest thing to a "free lunch" that anyone is ever likely to get from the tax system.

While some Albertans consider even talking about a provincial sales tax to be an act of heresy of the highest order, the analysis suggests that introducing such a tax makes good economic sense if coupled with a reduction in the personal income tax rate, and even better economic sense if coupled with an overall tax reduction as well. ■

Notes

1. About $400 million of the tax cut is due to the SRT; the remaining $200 million is due to the elimination of the flat tax and surtax, and other measures.

2. Under the new administrative structure, provinces may deviate from the federal definition of taxable income, but this will entail the imposition of administration charges if the tax is to be collected by the federal government. Moreover, while the provinces may enhance the federal government's non-refundable tax credits, they may not reduce them.

3. Quebec is not part of the TCA and levies its own tax on a base similar to the federal taxable income. However, the rate schedule in Quebec is substantially different from the federal schedule, and time constraints precluded a proper treatment of the Quebec system. As such, Quebec is excluded from the analysis.

4. The effective marginal tax rate for each income range is the weighted average of rates for each household in that income group.

5. One way of viewing the income tax from this perspective is that it is similar to a non-uniform consumption tax, with different tax rates imposed on consumption in different periods.

6. The behavioural adjustments in labour and savings markets will arise as individuals react to changes in marginal tax rates due to the change in the tax mix. Taking these adjustments into account lowers the revenue neutral AST rate slightly. If there were no such behavioural adjustments, as might be expected in the short-run, the revenue neutral AST rate would be 9.63%.

7. Because the AST is envisaged to be harmonized with the GST, the introduction of a small AST is akin to a small increase in the GST rate applied to Albertans

8. This equivalency between a consumption tax and an

income tax in the labour market is based upon a simple budget constraint that ignores other sources of income and wealth – for example, inheritances and pure profits. While the pure equivalency breaks down when these other factors are incorporated, we would observe the same sort of reactions in the labour market as suggested here. See Mintz and Wilson (1992) for an approach similar to that used here. Also, the AST as envisioned would not be fully comprehensive, as it would mirror the federal GST which is only applied to about 85% of consumption expenditures.

9. The marginal tax rates in the figure, and the subsequent calculations in this section, include payroll taxes for the Employment Insurance and Canada Pension Plan programs.

10. These are uncompensated labour supply elasticities; see the appendix.

11. The calculations assume the same elasticity applies at all levels of income. An argument could be made for using different elasticities for different income levels. For example, some studies suggest that labour supply elasticity is higher for low income workers than high income workers.

12. The efficiency calculations in the table are based upon the compensated labour supply elasticities associated with the uncompensated elasticities shown in the table using a marginal propensity to consume out of non-labour income of 0.2. See the appendix.

13. The integration issue is revisited in section 6.

14. The METRs on dividends and capital gains displayed in the table are the personal METRs, which ignore the taxation of this income at the corporate level. This is the appropriate effective tax rate concept in this section. In section 6, total METRs on dividends and capital gains, which reflect both personal and corporate taxes, are presented within the context of integration. Because interest payments are deductible at the corporate level, the personal and total METRs on interest income are the same.

15. See Poterba and Summers (1985); Poterba (1987); Boadway (1987); Zodrow (1991); and McKenzie and Thompson (1997).

16. A potentially important issue concerns the impact of changes in the taxation of interest and equity on the market return, r_m. While one might expect the return on the market to change, it is unclear how to model this in a way that lends itself to quantification for our purposes. There are, however, several factors that suggest that this might not be important. First, the relative change in the tax rate on interest and equity income is not all that large. Second, although there may be an overall portfolio rebalancing, the impact on the aggregate market return may not be that large. Finally, as discussed in the next paragraph, even closed economy simulations suggest that tax changes on the personal side of the capital market have only small effects on business capital formation.

17. It is important to interpret Figure 4.2 with some caution. As indicated earlier, the average tax rates in the figure are calculated on an annual basis; a lifetime calculation would be more appropriate. Also, the figure represents a very partial view of the progressivity of the entire tax and expenditure system. First, it only includes provincial income and commodity taxes, leaving out all federal taxes and many other types of taxes at the provincial level. Second, it should be noted that expenditures are the primary mechanism for redistribution in Canada; this is obviously not captured in the figure.

18. The behavioural changes are based upon the base case elasticity scenarios discussed in section 4.2.

19. Note that the per household increases in consumable income under the AST are greater than the per household efficiency gains reported in section 4.2. This is because the latter measures the change in consumer's surplus which is smaller than the change in income, which does not account for the value of forgone leisure. Thus, the change in consumable income is not an "exact" measure of the welfare change. However, for much of the ensuing discussion it is treated in that way, as it simplifies the discussion. The basic arguments would carry through to an exact welfare measure, although the magnitudes would obviously differ.

20. The actual rate STR rate used in the simulations was 6.2%.

21. Both of these scenarios and the "6 and 5" scenario involve the introduction of a sales tax credit program.

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Appendix: Technical Notes

1. The Labour Market

Marginal Cost of Public Funds

A recent paper by Dahlby (1998) provides the analytical backdrop for the analysis of the MCF. One of the key features of the expression for the MCF derived in that paper is that in the presence of a progressive tax system, the MCF depends on the weights on the income and substitution effects associated with an incremental tax change. The relative weight attached to the income and substitution effects are determined by the changes in individuals' marginal and average tax rates, which in turn depend upon the nature of the (incremental) tax policy change under consideration.

The model underlying the MCF in Dahlby's paper is a standard partial equilibrium static labour-leisure model:

$$\text{Max}U(C_i,L_i)\text{st.}C_i=Y_i-R_i \text{ (and a time constraint),}$$

where C_i is consumption for individual i, $Y_i=wL_i$ is before-tax (gross) labour income, w is the (presumed to be fixed) wage rate, L_i is labour supply and R_i is income tax revenue. The income tax system is progressive, with revenues given by:

$$R_i=z_i(Y_i-X_{i-1})+\sum_{j=1}^{i-1} z_j(X_j-X_{j-1})$$

where z_j is the marginal income tax rate in tax bracket j and the X_j's are the bracket thresholds (in ascending order from j=1...n, with $X_0=0$ and X_n=infinity).

Dahlby assumes that the only taxes imposed are income taxes on labour income. The model can be modified by considering the concurrent imposition of an indirect consumption tax in the form of a general sales tax, at rate g. In this case the budget constraint becomes $C_i(1+g)=Y_i-R_i$. Dividing both sides by (1+g) and re-arranging shows that this constraint can be re-written as $C_i=Y_i-R_i'$, where:

$$R_i'=m_i(Y_i-X_{i-1})+\sum_{j=1}^{i-1} m_j(X_j-X_{j-1})$$

and $m_i=z_i+\tau(1-z_i)$ and $\tau=g/(1+g)$.

Thus, we see that the imposition of a general sales tax is equivalent to adding $\tau(1-z_i)$ to each marginal tax rate; m_i can be thought of the effective ***total*** marginal tax rate on labour income facing individuals in bracket i, which includes both income and sales taxes. Note as well that the increase in the effective marginal tax rate arising from the sales tax is lower the higher the tax bracket (as the τ is multiplied by $(1-z_i)$).

Proceeding as in Dahlby, I define the average tax rate paid by individual i (which now includes both income and consumption taxes) as:

$$t_i=\sum_{j=1}^{i} x_{ij}m_j$$

where x_{ij} is the proportion of individual i's income subject to (effective) tax rate m_j. The change in the average tax rate arising from (small) changes in the marginal tax rates is:

$$dt_i=\sum_{j=1}^{i} x_{ij}dm_j$$

noting that given the definition of m_j, in our case $dm_j=(1-\tau)dz_j+(1-z_j)d\tau$ (whereas in Dahlby $dm_j=dz_j$). Thus, we see that changes in total marginal tax rates (the m_j's) can come about because of changes in marginal income tax rates (the z_j's) or changes in the general sales tax (τ).

The MCF is the change in the excess burden associated with the tax under consideration divided by the change in tax revenue resulting from a small increase in the tax, or MCF=dEB/dR. Continuing as in Dahlby, and assuming a perfectly elastic labour demand curve, the MCF for a generic change in the marginal tax rates (the m_j's) can be shown to be:

$$MCF=\frac{\sum_{j=1}^{n}\gamma_j dt_j}{\sum_{j=1}^{n}\gamma_j[1-\frac{m_j}{1-m_j}(\frac{dm_j}{dt_j}\eta_j^c+\theta_j)]dt_j}$$

where (γ_j is the share of gross (before-tax) income in tax bracket j, η_j^c is the compensated labour supply elasticity (capturing the substitution effect), and θ_j is the marginal propensity to consume out of non-labour income (capturing the income effect). Note that the change in the marginal tax rates ***relative*** to the change in the average tax rates (dm_j/dt_j) determines the "weight" on the substitution effect (η_j^c) relative to the income effect (θ_j). In particular, note that if $dm_j=dt_j$, then only the uncompensated labour supply elasticity enters the MCF formula (as the uncompensated labour supply elasticity is $\eta_j=\eta_j^c+\theta_j$).

When using the above formula to determine the MCF associated with a ***small*** increase in marginal rates, a key issue is how the tax change under consideration alters the average tax rate (dt_j) and the marginal tax rate relative to the average tax rate (dm_j/dt_j) for the various tax brackets. Dahlby considers several possibilities – a small increase in just one marginal tax rate, a small increase in all marginal tax rates by the same ***absolute*** amount (average rate progression preserving (ARP)), a small increase in all marginal tax rates by the same ***proportional*** amount (liability progression preserving (LP)), and a small increase in marginal tax rates that is proportionately greater the lower is the tax bracket (residual income progression preserving (RIP)).

Our interest here is with two very specific types of rate increases. The first is a small increase in all of the marginal ***income*** tax rates (the z_i's) above a basic exemption level by the same absolute amount. If we view z_j as the combined federal/provincial marginal tax rate for bracket j, then this is akin to a small increase in the Alberta single rate tax (SRT) from its proposed level of 11%. For simplicity, assume that bracket j=1 is below the SRT exemption level (which differs from the federal exemption level) and all brackets j>1 are above it.

Recall from above that in our case, $dm_j=(1-\tau)dz_j+(1-z_j)d\tau$. Setting $dz_i=dz_j=dz$ for all i and j greater than 1 and letting $d\tau=0$, then $dm_j=(1-\tau)dz$ for all j>1. Similarly, recall from above that the change in the total (income plus consumption) average tax rate is:

$$dt_i=\sum_{j=2}^{i}x_{ij}dm_j$$

Using $dm_j=(1-\tau)dz$ from above, in our case this becomes $dt_i=(1-\tau)dz$. Thus we have $dm_j/dt_j=1$. Substituting this and $dt_i=(1-\tau)dz$ into the generic MCF formula presented above, and simplifying, gives the following expression for the MCF for a small increase in the Alberta SRT:

$$MCF^{srt}=\frac{\sum_{j=2}^{n}\gamma_j}{\sum_{j=2}^{n}\gamma_j[1-\frac{m_j}{1-m_j}\eta_j]}$$

As discussed above, with $dm_j/dt_j=1$ the weight on the substitution effect is equal to the weight on the income effect and only the uncompensated labour supply elasticity enters the SMCF formula. This expression is similar to that derived in Dahlby for an equal absolute increase in all marginal rates (his ARP case) with the two important exceptions. The first is that in our case the equal absolute increase in marginal tax rates occurs only for the brackets above the Alberta exemption level, the second is that in our case $m_j=z_j+\tau(1-z_j)$ (rather than $m_j=z_j$ in Dahlby's case). Note also that the MCF^{srt} expression is "weighted" using the share of gross (before-tax) income (the (γ_j's).

The second type of tax increase that we are interested in is a small increase in the general sales tax rate, g, as represented by $d\tau$ (recalling that $\tau=g/(1+g)$). This is comparable to increasing the existing federal sales tax (the GST) by a small amount, which is akin to the introduction of a small general sales tax in Alberta (an AST). Proceeding as above, we now have $dm_j=(1-z_j)d\tau$. Substituting this into the expression for dt_j as above, rearranging and simplifying, gives:

$$dt_i=(1-t_i^I)d\tau$$

where,

$$t_i^I=\sum_{j=1}^{i}x_{ij}z_j$$

is the average ***income*** tax rate for taxpayer i, which is distinct from the average ***total*** tax rate t_i, which includes both the income tax and the sales tax. Using the expressions for dm_i and dt_i^I we have $dm_j/dt_j=(1-z_j)/(1-t_j^I)$, which we substitute along with $dt_j=(1-t_j^I)$ into the generic SMCF formula to get:

$$MCF^{ast}=\frac{\sum_{j=1}^{n}\alpha_j}{\sum_{j=1}^{n}\alpha_j[1-\frac{m_j}{1-m_j}(\frac{1-z_j}{1-t_j^I}\eta_j^c+\theta_j)]}$$

where $\alpha_j=(\gamma_j(1-t_j^I)$ is the share of after-***income*** tax income in bracket j – thus MCF^{ast} is "weighted" using after-income tax income (but not after consumption taxes) rather than before-tax income, as was the case for an increase in the SRT rate. With the important exception that the definitions of the m_j's differ, this expression is identical to Dahlby's RIP formula.

Thus, we see that a small increase in the SRT amounts to a modified average rate progression preserving (ARP) increase, whereby all marginal tax rates above the exemption level are increased by the same absolute amount, while a small increase in the AST amounts to a residual income (RIP) progression preserving increase, whereby the marginal rate increases are lower in the higher tax brackets. This makes sense in light of the observation made earlier that the increase in the effective marginal tax rate arising from the sales tax is lower the higher the tax bracket (as the introduction of the sales tax adds $\tau(1-z_i)$ to each tax bracket, which is lower for high brackets that low brackets).

It is difficult to determine *a priori* whether MCF^{ast} is greater or less than MCF^{srt}, and thus whether the marginal efficiency cost in the labour market of raising another dollar of revenue from the AST is greater or less than the cost of raising another dollar from the SRT. To see this, first note that in a progressive income tax system $z_j>t_j^I$ (the marginal tax rate on an individual in bracket j will exceed the average tax rate). This means that in the MCF formula for the AST the weight on the substitution effect (η_j^c) is less than the weight on the income effect (θ_j). Since $\eta_j^c>\eta_j$, this means that for each j, the term in square brackets in the denominator of the $SMCF^{ast}$ expression will be greater than the similar term in the MCF^{srt} expression; this in and of itself suggests that $MCF^{ast}<MCF^{srt}$. However, recall that the weights applied in the two expressions differ, with the AST expression weighted by after-income tax (but before commodity tax) income, while the SRT expression is weighted by gross (before all taxes) income. Weighting by after-income tax income puts more weight on lower income individuals relative to weighting by gross income, because the tax system is progressive. Since low income individuals face lower marginal tax rates this, in and of itself, also suggests that $MCF^{ast}<MCF^{srt}$. But, offsetting this is the fact that an increase in the AST raises total marginal tax rates by a greater amount for low income brackets (which are now weighted higher) than high income brackets; this, in and of itself, suggests $MCF^{ast}>MCF^{srt}$! Thus, an unambiguous ranking is not possible and we must undertake a calculation of the MCF associated with the two types of tax increases in order to assess the marginal efficiency implications of changing the tax mix.

Measuring Efficiency Gains

The determination of the total labour market efficiency costs of various AST/SRT configurations is based upon a standard partial equilibrium approximation. The ***equivalent variation*** (EV) is a commonly used measure of the efficiency costs associated with a tax. As shown in Boadway and Bruce (1984, chapter 7) an approximation of the EV can be obtained as a second order Taylor series approximation of the consumer's expenditure function around the undistorted equilibrium. This turns out to be a linear approximation of the area under the appropriate ***compensated*** labour supply curve. To see this, consider Figure A.1, which depicts a compensated labour supply curve; as above, demand is assumed to be perfectly elastic. The EV associated with a tax on the labour income of income group i at rate m_i is given by the area ADB. Linarizing the compensated labour supply curve at the undistorted equilibrium point A gives an approximation of the EV of area ADE. The slope of the linear approximation of the compensated supply curve is $w/L_i\,\eta_i^c$, where η_i^c is the compensated labour supply elasticity for income group i. The vertical distance DE is equal to the tax rate m_i times the wage rate w, or wm_i. The horizontal distance DA is then equal to distance DE divided by the slope of the linear approximation of the supply curve, which gives $\eta_i^c m_i L_i$. The approximation of the EV, area ADE, is then one-half times the vertical distance DE times the horizontal distance DA, or:

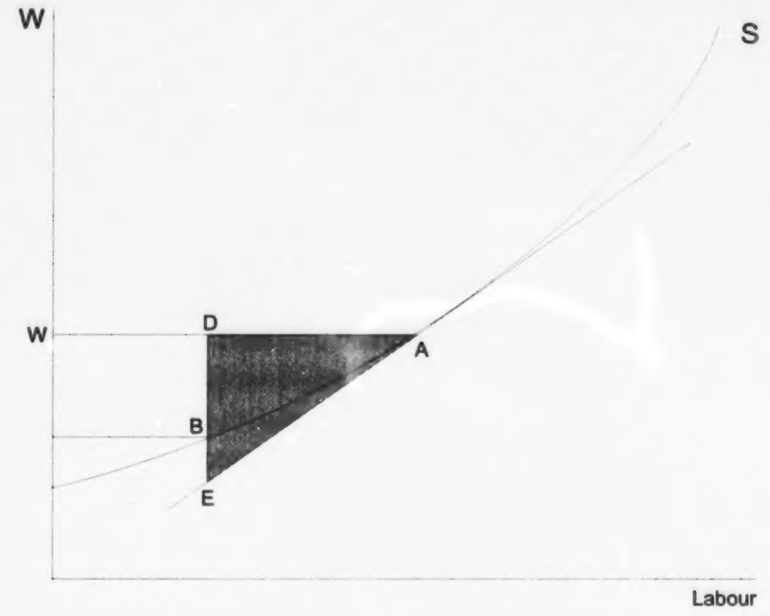
$$EV_{L_i}=(1/2)m_i^2\eta_i^c wL_i$$

To calculate the efficiency cost of a tax on labour income for the entire economy, take a weighted average of the EV's for each income group, weighting each group by its share of total tax revenue (W_i), and assume that the compensated elasticity of labour supply is equal to η^c for all income groups,

$$\frac{EV_L}{Y}=(1/2)\gamma_L\eta^c\sum_i W_i m_i^2$$

where (γ_L is labour's share of income in the economy

Figure A.1
Efficiency Costs in the Labour Market



and Y is total provincial income. Estimates of m_i, W_i, γ_L and η^c allow us to calculate the efficiency cost of taxation in the labour market.

The calculations of the efficiency costs and the MCFs in the text assume $\theta=-0.2$, and therefore that $\eta^c=\eta+0.2$, where η is the uncompensated labour supply elasticity (see Dahlby 1998).

2. The Capital Market

In any investigation of the efficiency implications of a change in the tax mix in the capital market, account must be taken of the diverse ways in which different forms of capital income are taxed. In particular, and as discussed in the text, the bulk of income from savings in Canada is not taxed at all at the personal level because of various features of the tax system – Poddar and English (1999) estimate that as much of 75% of investment income escapes personal taxes, and is thus effectively subject to a zero percent marginal tax rate. As such, for many taxpayers the Canadian income tax is really a direct consumption tax.

The bulk of the investment income that is taxed is subject to a fairly flat statutory marginal rate structure, as most of the progression in the income tax system takes place at low levels of income where the income tax is virtually a consumption tax in any event (see, for example, Figure 4.1). However, the ***statutory*** marginal rate on investment income is not the appropriate rate to use for the determination of the efficiency costs of taxation. Rather, we are interested in the ***marginal***

effective tax rate (metr) on investment income. The metr takes into account various features of the taxation of investment income, and can vary substantially across types of investment income.

The approach taken here is to determine the metr on three types of investment income that are subject to taxation – interest, dividends and capital gains – and use the weighted average of these metrs in the calculation of the MCF and total efficiency costs of the SRT in the capital market.

Interest

The key feature of the taxation of interest income that is relevant for our purposes is that there is no allowance for inflation, as the tax is imposed upon nominal interest income as it accrues (at least for the most part).

Thus, the real (inflation adjusted) after-tax (net) rate of return on an interest bearing investment is:

$$r_i^n = i(1-m) - \pi$$

where i is the nominal interest rate, π is the expected rate of inflation, and m is the statutory personal income tax rate. Recall that for investment income that is in fact subject to tax, a flat statutory rate is presumed, thus there is no subscript on m.

The real before-tax (gross) rate of return is simply:

$$r_i^g = i - \pi$$

The real marginal effective tax rate on interest income is the hypothetical tax rate, τ_i, that if levied on the real gross rate of return would yield the net rate of return. Thus, τ_i solves $r_i^g(1-\tau_i) = r_i^n$, which gives $\tau_i = (r_i^g - r_i^n)/r_i^g$, which, substituting from above, gives:

$$\tau_i = \frac{im}{i-\pi}$$

Dividends

Nominal dividends are subject to taxation on receipt. To determine the metr on dividends we must first determine the ***nominal*** marginal effective tax rate at the personal level, which takes account of the dividend tax credit provisions.

Canada's gross-up and credit approach to dividend taxation is intended (at least partly) to eliminate the double taxation of dividends by giving taxpayers notional credit for taxes paid at the corporate level on dividends distributed to individuals. The system works as follows (see McKenzie and Thompson 1997). Say after the payment of corporate income and other taxes a corporation pays out $1 in dividends to its shareholders. These dividends are then grossed-up by a factor of 1/(1-d), where d is the dividend tax credit rate, giving taxable dividends of $1/(1-d). Taxable dividends are then taxed at the individual's ordinary marginal tax rate, m, for a gross (before dividend tax credit) tax liability on the $1 dividend of $m/(1-d). The individual is then given "credit" for the taxes paid on the grossed-up dividends at the corporate level at the notional rate of d; this credit is $d/(1-d). The individual's final tax liability, net of the dividend tax credit, is $m/(1-d)-$d/(1-d), which suggests a marginal effective statutory tax rate on the $1 dividend received of:

$$m_d = \frac{m-d}{1-d}$$

This is what is referred to as the ***nominal*** marginal effective tax rate on dividends. Proceeding as above with interest income, we can then determine the impact of the taxation of nominal dividends by calculating the ***real*** marginal effective tax rate on dividends as:

$$\tau_d = \frac{ym_d}{y-\pi}$$

where y is the nominal dividend yield and m_d is the nominal marginal effective tax rate on dividends, as determined above.

Also of interest is the nominal marginal effective ***total*** (personal plus corporate) tax rate on dividends. To determine this, note that given a corporate tax rate of u, in order to pay out $1 in dividends to the shareholder after the payment of corporate taxes, the corporation must generate taxable income at the corporate level of $1/(1-u). Corporate taxes on this taxable income are then $u/(1-u). Total taxes paid on the taxable income generated within the corporation and distributed to individuals as dividends amount to $m_d+u/(1-u)$, where m_d is the nominal effective personal tax rate on dividends derived above. Converting this into a tax rate by dividing by the initial $1/(1-u) in pre-tax corporate income gives a total corporate plus personal tax rate on dividend distributions of:

$$m_{td}=m_d(1-u)+u=\left[\frac{m-d}{1-d}\right](1-u)+u$$

Note that if the dividend tax credit rate is set equal to the corporate tax rate (d=u), then $m_{td}=m$ and the total nominal effective tax rate on dividend income is equal to the personal tax rate on ordinary income; in this case, the tax system is said to be fully integrated. If d<u and therefore $m_{td}>m$, the tax system is said to be under integrated, while if d>u and therefore $m_{td}<m$ the tax system is said to be over integrated.

Capital Gains

For capital gains, three elements of the tax system are relevant in the determination of the marginal effective tax rate. First, like interest and dividends, nominal capital gains are taxed with no allowance for inflation. Second, capital gains are taxed upon realization, rather than as they accrue. This allows individuals to defer capital gains taxes by postponing the realization of the capital gains, giving rise to a ***deferral effect.*** Third, upon realization only 75% of capital gains are included in income. As above, all of these features of the tax system must be taken into account in order to determine the marginal effective tax rate on capital gains (see Glenday and Davies 1990).

To begin, define the effective ***statutory*** capital gains rate as $m_c=xm$, where x is the capital gains inclusion rate (75%) and m is the ordinary personal tax rate. Now consider a $1 investment in an asset that grows in value at a nominal rate of g% per year. Say the asset is held for N years, after which it is sold and a capital gain is realized. The before tax proceeds of disposition are $(1+g)^N$, the capital gains tax paid on those proceeds are $m_c((1+g)^N-1)$, yielding net of tax proceeds of $(1+g)^N-m_c((1+g)^N-1)=(1+g)^N(1-m_c)+m_c$. Define the ***accrual equivalent*** nominal marginal effective tax rate on capital gains as the hypothetical rate of tax that if applied to nominal capital gains as they accrue yields the same net of tax proceeds from disposition upon realization of the gain as the existing tax system, which taxes the gain on realization. Thus, the accrual equivalent nominal marginal effective tax rate on capital gains, denoted $\tau_c{}^n$, solves:

$$[1+g(1-\tau_c{}^n)]^N=(1+g)^N(1-m_c)+m_c$$

where the right hand side is the actual net of tax proceeds of disposition when capital gains are taxed on realization and the left hand side is the hypothetical net of tax proceeds if nominal capital gains were taxed on accrual at rate τ_c^n. Solving this for τ_c^n gives a nominal metr on capital gains of:

$$\tau_c^n = \frac{(1+g)-[(1+g)^N(1-m_c)+m_c]^{1/N}}{g}$$

The nominal metr on capital gains takes two of the three factors mentioned above into account – the taxation of capital gains on realization rather than accrual and the inclusion of 75% of capital gains in income. The fact that nominal capital gains are taxed rather than real capital gains, with no allowance for inflation, may be handled in the same way as we handled dividends and interest. Thus, the real metr on capital gains is:

$$\tau_c = \frac{g\tau_c^n}{g-\pi}$$

The calculation of the metrs on interest dividends and capital gains requires information on the various statutory tax parameters, such as the marginal income tax rate, the dividend tax credit rate and the capital gains inclusion rate. It also requires assumptions about various "economic" parameters, such the interest rate (i), dividend yield (y), the capital gain rate (g), the inflation rate (π) and, in the case of the metr on capital gains, the holding period (N).

As above with dividends, if it is presumed that $1 in after-tax corporate income generates a $1 capital gain at the personal level, the total (personal plus corporate) nominal effective tax rate on capital gains is:

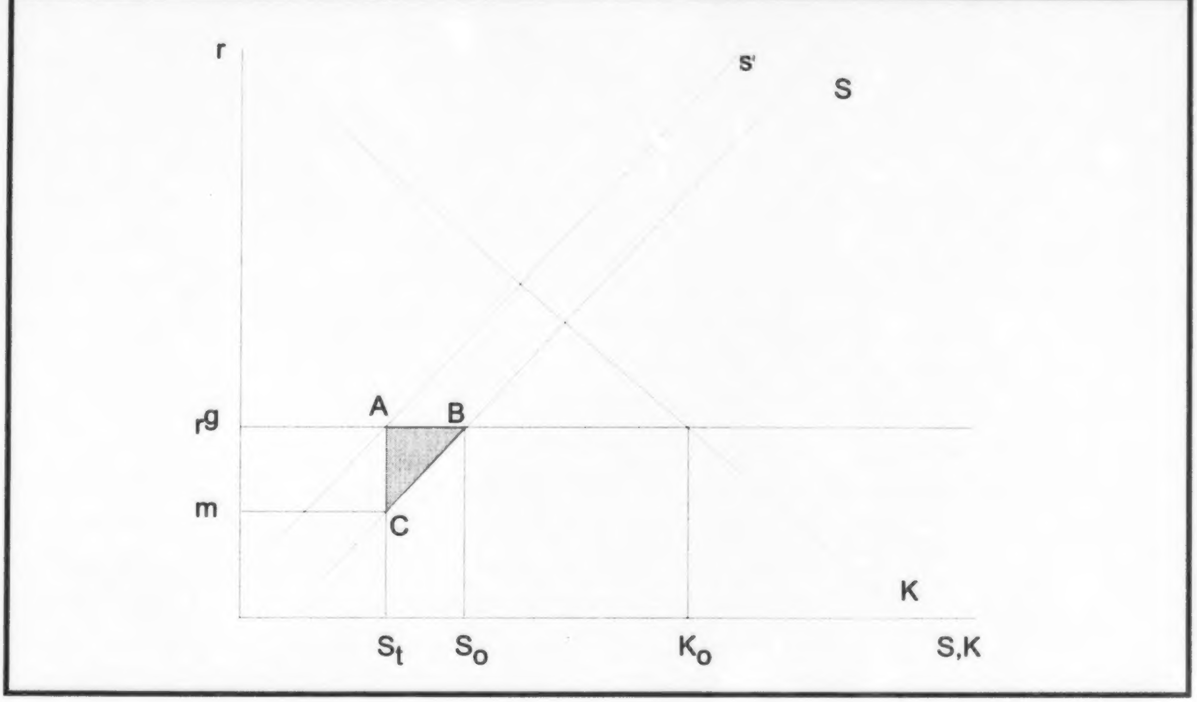
$$m_{td}=t_c^n(1-u)+u$$

Capital Market Efficiency in a Small Open Economy with Perfect Capital Mobility

In a small open economy with perfect capital mobility, a "disconnect" occurs between domestic saving and investment. This is depicted in Figure A.2. The required after corporate tax, before personal tax, real rate of return is fixed by international financial markets at r^g. The domestic supply of savings curve is denoted S and the domestic demand for capital curve is denoted K. In the absence of a domestic tax on the return to savings at the personal level, given the rate of return domestic savers save an amount equal to S_0. At this required rate of return the demand for capital by domestic businesses, on the other hand, is K_0. Since the domestic demand for capital exceeds the domestic supply of capital by (K_0-S_0), the excess demand is met by foreign capital inflows, and Alberta is a capital importing economy. The imposition of an income tax on real investment income at the personal level at the effective rate τ shifts the domestic supply of savings curve to S', reducing the net of tax real rate of return to savings to $r^n=r^g(1-\tau)$ and lowering the amount of domestic savings to S_t (the τ can be viewed as the weighted average of the real metrs derived in the previous section). While domestic savings falls, the amount of domestic investment by businesses does not change from K_0; rather, foreign investment increases by S_0-S_t.

The tax on the return to savings at the personal level generates an efficiency cost given by the area ABC. Because of the "disconnect" associated with perfectly mobile capital, the efficiency costs are restricted to the supply side of the market. In a matter exactly analogous to the determination of the efficiency costs in the labour

Figure A.2
Efficiency Costs in the Capital Market, Small Open Economy



market in section 1 of this appendix, the efficiency cost in the savings market as a percentage of output can be derived as:

$$\frac{EB_s}{Y} = (1/2)\tau^2 r\gamma_s\varepsilon_s{}^c$$

where τ is the weighted average real marginal effective tax rate on savings, r is the before personal tax real rate of interest, ,$\varepsilon_s{}^c$ is the compensated elasticity of savings supply with respect to the real interest rate, and (γ_s is the ratio of the ***stock*** of savings to provincial income. Estimates of these parameters allow us to determine efficiency costs in the savings market as a percentage of domestic income.

Determination of the Tax Adjusted CAPM

A modification of a model by Apel and Sodersten (1999) is used to develop the appropriate capital market arbitrage condition. Consider a standard portfolio choice model where a consumer chooses the fraction of her initial endowment of wealth to invest in either a risk free bond, with the rate of return determined on international financial markets, or risky equity, which can only be held by domestic investors. Thus,

$$\text{MaxEU}(c)$$

$$\text{s.t. } c=W[1+i(1-m_i)+\sum_{j=1}^{N} x_j(\rho_j(1-m_e)-i(1-m_i))]$$

where c is consumption, W is initial wealth, x_j is the fraction of that wealth invested in financial asset j, ρ_j is the expected before-tax rate of return on equity in firm j, and i is the risk free rate of return on bonds. Note that there are N risky securities (equity) and one riskless security (bonds) for a total of N+1.

The first-order condition for this problem for the investment in asset j is:

$$\rho_j = i\,\frac{1-m_i}{1-m_e} - \frac{COV(U'(c),\rho_j)}{EU'(c)}$$

where $COV(U'(c),\rho_j)$ is the covariance between the marginal utility of consumption and the expected before-tax rate of return on equity in firm j. If it is presumed that the returns on the equity assets are joint normally distributed, then a theorem due to Rubenstein (1976) implies that $COV(U'(c),\rho_j) = EU''(c)COV(c,\rho_j)$, in which case the above condition can be written as:

$$\rho_j = i\,\frac{1-m_i}{1-m_e} + AW(1-m_e)COV(c,\rho_j)$$

$$\text{where } A = -\frac{EU''(c)}{EU'(c)}$$

A is the coefficient of global absolute risk aversion, which is assumed to be constant. Since final consumption in this two period model is equal to the market value of wealth, this can alternatively be written as:

$$\rho_j = i\,\frac{1-m_i}{1-m_e} + AW(1-m_e)COV(r_m,\rho_j)$$

where r_m is the expected return on the market portfolio.

And indeed, since this equation holds for all assets in equilibrium, it must also hold for the market portfolio, which implies that:

$$r_m = i\,\frac{1-m_i}{1-m_e} + AW(1-m_e)VAR(r_m)$$

where $VAR(r_m)$ is the variance in the rate of return on the market portfolio. Solving this for $AW(1-m_e)$ and substituting it into the equation for the before-tax expected return on asset j above, gives the following capital market equilibrium condition, which is a version of the tax adjusted capital asset pricing model:

$$\rho_j = i\,\frac{1-m_i}{1-m_e} + \left[r_m - i\,\frac{1-m_i}{1-m_e}\right]\beta_j$$

where $\beta_j = COV(r_m,\rho_j)/VAR(r_m)$ is the firm's CAPM "beta," which is a measure of its systematic or market risk.